

SELECT COMMITTEE ON
SCIENCE AND TECHNOLOGY

SCIENCE BUDGET 1991-92

VOLUME II—EVIDENCE

Ordered to be printed 20 March 1991

LONDON: HMSO

£17.25 net



22501853027

VOLUME II—CONTENTS

ORAL EVIDENCE

SCIENCE AND TECHNOLOGY RESEARCH COUNCIL

Written Evidence

Oral Evidence

SELECT COMMITTEE ON
SCIENCE AND TECHNOLOGY

UNIVERSITIES FUND

Written Evidence

Oral Evidence, 27 February 1991

ADVISORY BOARD FOR THE RESEARCH COUNCILS

Oral Evidence, 8 March 1991

Tables and Figures

COMMITTEE ON THE SCIENCE BUDGET

Written Evidence

Oral Evidence, 8 March 1991

SCIENCE BUDGET 1991-92

THE RT HON. LORDS CLYDE, LE, MP, SECRETARY OF STATE

FOR EDUCATION AND SCIENCE

Written Evidence

Oral Evidence, 26 March 1991

VOLUME II—EVIDENCE

WRITTEN EVIDENCE

Agriculture and Food Research Council

Committee of Directors of Polytechnics

Dietary, Protein & L-Polysaccharide of Huddersfield

Economic and Social Research Council

Graham Smith, 36 Prince, University of Manchester

Institution of Electrical Engineers

Jones, Dr R & Y

Kelly, Professor A, University of Surrey

Medical Research Council

Mitchell, Dr William

National Environment Research Council

Polytechnics and College Funding Council

Price, C, Eng, Director, Leeds Polytechnic

Ray, Professor B, Cambridge

Roberts, Dr D M, University of Cambridge

Royal Society

Sax, British Society

Science and Engineering

Thompson, Professor S

University of Birmingham

Wilson, Professor Z G, University of Birmingham

Wright, Dr A, Sunderland

Ordered to be printed 20 March 1991

INFORMATION CENTRE

Wellcome Centre for Medical Science

LONDON: HMSO

£17.25 net

2422101 1991-92

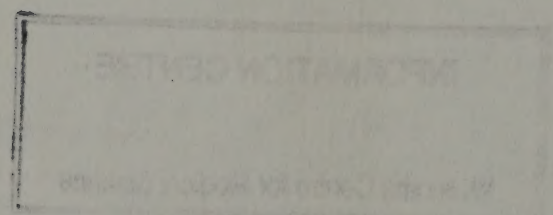
HOUSE OF LORDS

SCIENCE AND TECHNOLOGY

SUBJECT COMMITTEE ON
SCIENCE AND TECHNOLOGY

SCIENCE BUDGET 1991-92

WILLIAM D. THOMAS



VOLUME II—CONTENTS

ORAL EVIDENCE

Page

SCIENCE AND ENGINEERING RESEARCH COUNCIL

Written Evidence	3
Oral Evidence, 27 February 1991	8

UNIVERSITIES FUNDING COUNCIL

Written Evidence	18
Oral Evidence, 27 February 1991	18

ADVISORY BOARD FOR THE RESEARCH COUNCILS

Oral Evidence, 6 March 1991	25
Tables and Figures	34

COMMITTEE OF VICE-CHANCELLORS AND PRINCIPALS

Written Evidence	39
Oral Evidence, 6 March 1991	40

THE RT HON KENNETH CLARK, QC, MP, SECRETARY OF STATE FOR EDUCATION AND SCIENCE

Written Evidence	49
Oral Evidence, 20 March 1991	52

WRITTEN EVIDENCE

Agriculture and Food Research Council	62
Committee of Directors of Polytechnics	68
Durrands, Professor K J, Polytechnic of Huddersfield	70
Economic and Social Research Council	70
Graham-Smith, Sir Francis, University of Manchester	72
Institution of Electrical Engineers	73
Jones, Dr R A Y	74
Kelly, Professor A, University of Surrey	76
Medical Research Council	77
Mitchell, Sir William	82
Natural Environment Research Council	84
Polytechnics and Colleges Funding Council	86
Price, C, Esq, Director, Leeds Polytechnic	87
Ray, Professor B, Coventry Polytechnic	87
Roberts, Dr D H, University College London	88
Royal Society	90
Save British Science	92
Science and Engineering Research Council (further written evidence)	96
Thompson, Professor Sir Michael, University of Birmingham	108
University of Birmingham	108
Wilson, Professor E G, University of London	110
Wright, Dr A, Sunderland Polytechnic	111

<i>Letters to the Chairman on SERC Funding</i>	<i>Page</i>
Atiyah, Sir Michael, President, The Royal Society	112
Aveyard, Dr R, University of Hull	112
Bodmer, Professor A R, University of Illinois	112
Booth, Dr J G, University of Salford	113
Burcham, Professor W E, University of Birmingham	114
Cannon, Dr R D, University of East Anglia	114
Cosgrove, Dr T, University of Bristol	115
Crowley, T L, University of Salford	115
Elliott, Dr S R, University of Cambridge	116
Forgan, Dr E M, University of Birmingham.. .. .	116
Gabrys, Dr B J, Brunel University	117
Greaves, Dr C, University of Birmingham	117
Hall, Dr P G, University of Exeter	117
Hardman, T M, University of Reading	118
Hartley, Professor F R, Cranfield Institute of Technology.. .. .	118
Higgins, Professor J S.. .. .	118
Mitchell, Dr P C H, University of Reading	119
Mottelson, Professor B, Nordisk Institut for Teoretisk Fysik, Denmark	119
Nagarajan, M A, Daresbury Laboratory, Warrington	120
Nelmes, Professor R J.. .. .	120
Newport, Dr R J, University of Kent	121
Paul, Dr D McKenzie, University of Warwick	122
Perkins, Dr S J, Royal Free Hospital School of Medicine	123
Prassides, K, University of Sussex	124
Rayment, Dr T, University of Cambridge	124
Richards, Dr R W, University of Durham	124
Richardson, Dr R M, University of Bristol	125
Roser, Dr S J, University of Bath	125
Schiffer, Professor J P, Argonne National Laboratory, University of Chicago	125
Seddon, Dr J M, University of Southampton	126
Squires, Dr G L, University of Cambridge	126
Stanley, Dr H	127
Stirling, Professor W G, University of Keele.. .. .	128
Willis, Professor B T M	129

MINUTES OF EVIDENCE

TAKEN BEFORE THE SELECT COMMITTEE
ON SCIENCE AND TECHNOLOGY

WEDNESDAY 27 FEBRUARY 1991

Present:

Adrian, L.	Kearton, L.
Butterworth, L.	Kirkwood, L.
Carver, L.	Nicol, B.
Dainton, L.	Platt of Writtle, B.
Flowers, L. (Chairman)	Taylor of Blackburn, L.
Gregson, L.	Whaddon, L.

Written evidence from Sir Mark Richmond, Chairman, SERC

RESEARCH COUNCIL FUNDING:

Q1 (i)-(iv) The SERC's current funding problems have four basic causes:

- (a) A PES settlement which does not match the inflation in the Council's costs; in particular:
- (b) A PES settlement which does not match the salary awards both in universities and in the Council's own Establishments. Every 1 per cent of an academic salary settlement that is "unfunded", costs the SERC an extra £1 million.
- (c) A higher than anticipated increase in the cost of international subscriptions [see fig. 1 for the year on year cost of the CERN subscription]. For example, the Net National Income value for the UK was increased in December 1990. This change added £3.6 million to our spend on CERN in 1991.
- (d) A marginal over-commitment of resources by SERC. In practice, this amounts to about £10 million on an annual spend of about £450 million. In October 1990 our best estimate of the size of the PES settlement needed to pay for our programme was £40 million. Fig. 2 shows the SERC's net expenditure in real and cash terms from 1965-1991, and projections over the Forward Look period in the light of current allocations.

Q1 (v) The difficulty of terminating projects undoubtedly hinders a rapid response to a potential overspend. Furthermore, certain parts of a programme are more easy to stop than others. Some are international and binding agreements; others relate to the support of large facilities. In 1991-92 the grant and studentships spend of the SERC will have to accommodate the cut-backs needed to match our programme to our finances, even though grants and studentships are the areas the Council (and the ABRC) would wish to protect. The reason is that other areas of the Council's spend are harder to reduce quickly.

Q1 (vi) No comment.

Q2 I have called the allocation "lousy" and I do not feel I have to alter that view. The allocation will cause us major problems and the outline of the way we will have to proceed is set out in the attached Press Release.

Q3 The SERC's programme in April 1992 will be significantly smaller than the programme in April 1991. I suppose this could be called "a continuing development".

Q4 Our most pressing problems are:

- (a) The need for the PES allocation to match the inflation in our costs and salaries.
- (b) The need to introduce some mechanism whereby we are protected to a degree against the non-volume increase in cost of international agreements, many of which were negotiated by HMG and not by SERC.
- (c) Some device for smoothing see-sawing in the PES outcome year on year.

Q5 Yes, we will be reconsidering the balance of our portfolio. This would be necessary anyway because of developments in science and engineering; but the funding shortfall, and its particular nature, require us to adjust the programme to prevent an ever-increasing part of our allocation being consumed by international subscriptions, where these are outside our control.

CHANGES IN THE DUAL SUPPORT SYSTEM

- Q1 (i) It *should* have no effect on the funds available for teaching. It may in due course affect the quality of teaching, particularly in science and engineering, for those who wish to make a life for themselves in scientific research.
- Q1 (ii) It should lead to a more focused deployment of funds to support specific researchers. Much will depend on the fine print of how the universities (and now the Polytechnics) are required to use funds made available for overheads by the Research Councils.

27 February 1991]

[Continued]

Q1 (iii) This will depend on how much of the research money currently deployed through the UFC becomes transferred to the Research Councils. The Charters of the Research Councils will require the use of the transferred research money to be more tightly focused than at present.

Q2 I believe the transfer of research money from the UFC to the Research Councils will accelerate the emergence of research-based universities.

Q3 Studies are currently underway on the estimation of research overheads. It is probably easier than many have felt. At least a fairly convincing catalogue of possible elements in the overhead has been prepared. A major problem that may follow the introduction of the new system is likely to relate to the financial viability of some universities after the transfer. This is because it is very probable that universities spread the support given by the UFC for research more widely than will be possible when the sums are deployed via the research councils under their charters. A further point is that, following the transfer, the Research Councils would logically have to pay an overhead on grants made to the Polytechnics, to Cranfield and to the Open University, institutions that currently receive no "dual support" from their specific funding agencies.

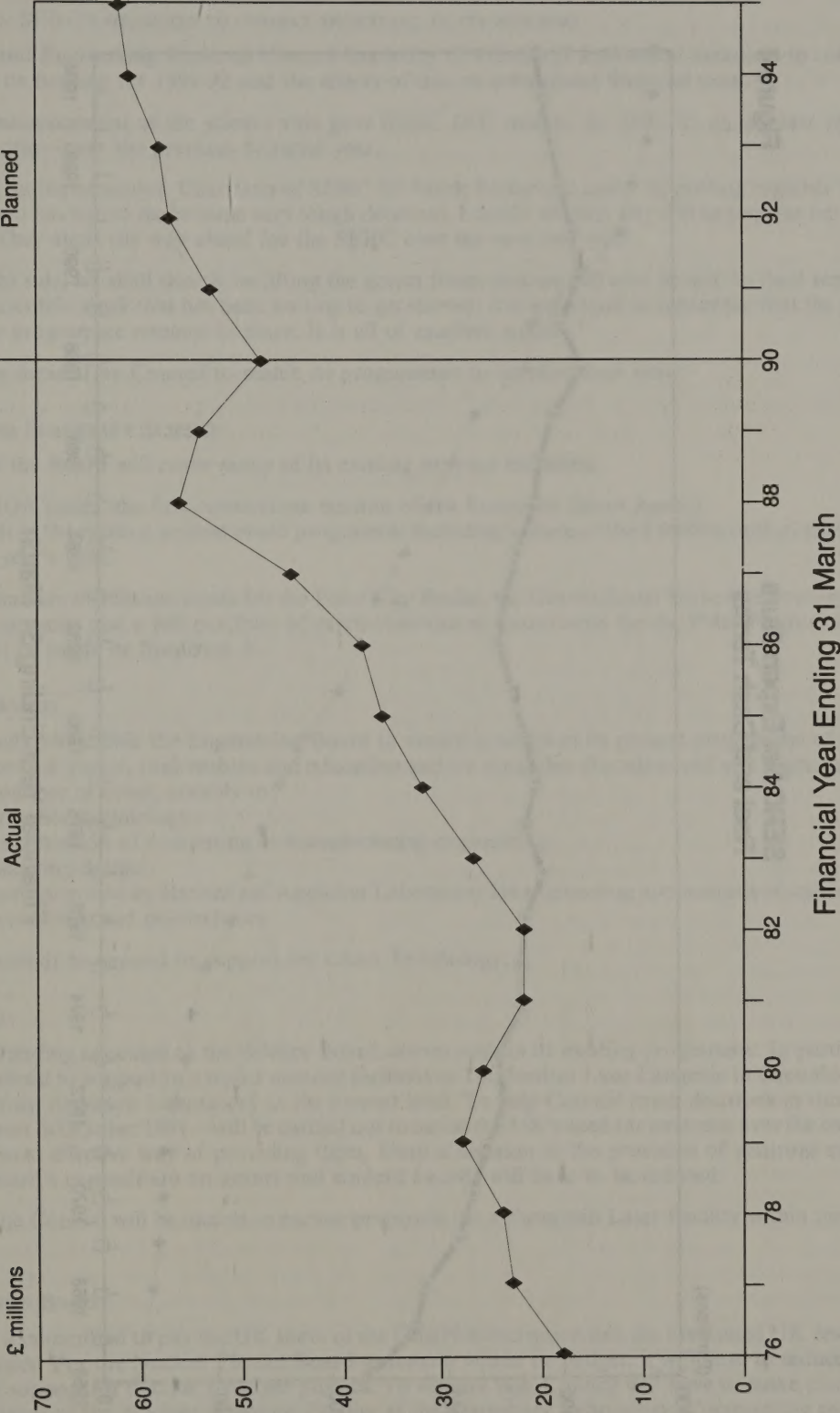
Q4 The advantages of the new system are that research money should become more precisely used to support good research. The disadvantage is that very bright young potential researchers, in parts of the higher education system that do not attract research support through research Councils, are less likely than now to be able to fulfil their vocation.

27 February 1991]

[Continued

Figure 1

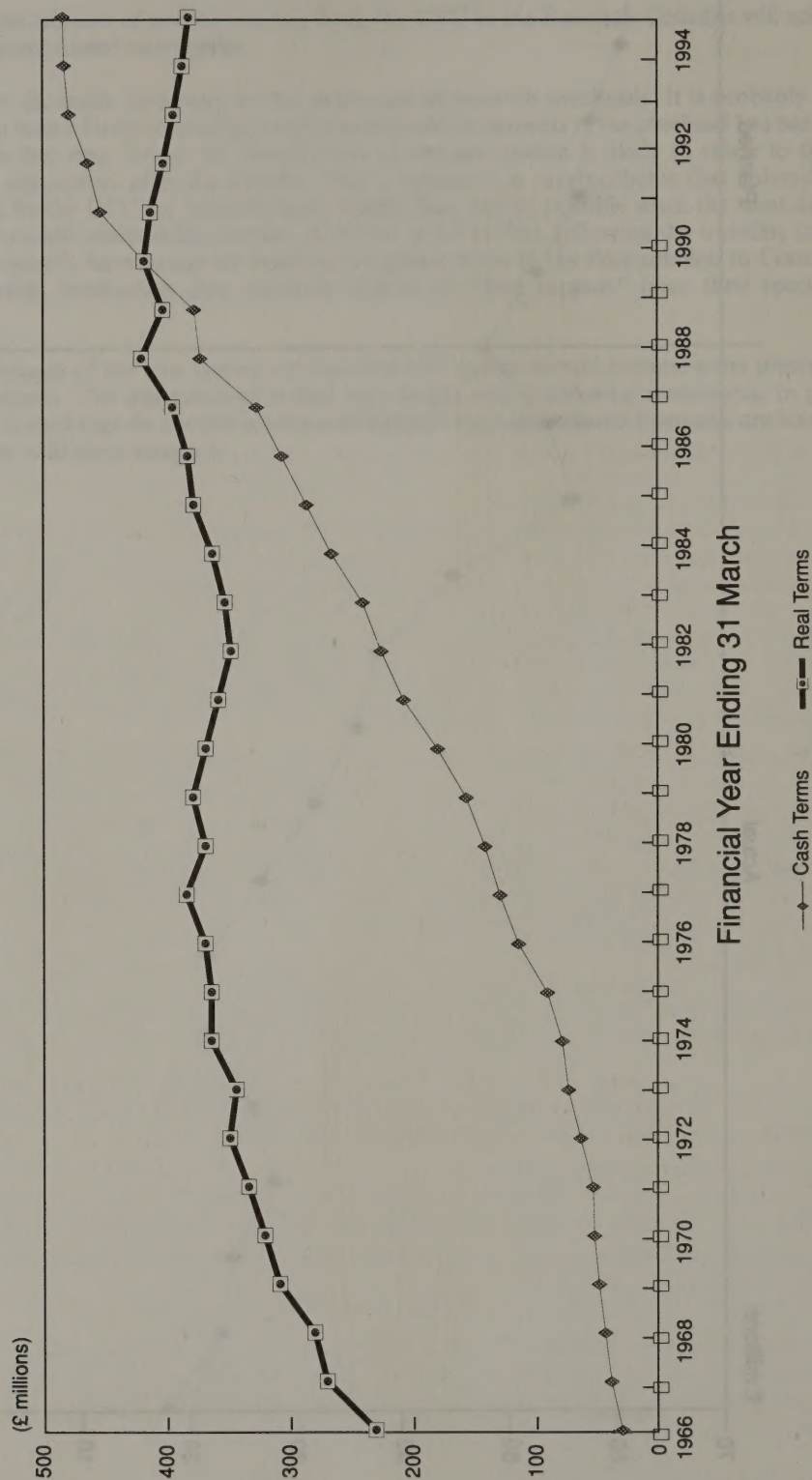
CERN Expenditure 1975/76-1994/95
Cash Prices



27 February 1991]

[Continued]

Figure II

SERC Net Expenditure
Real and Cash Terms

27 February 1991]

[Continued

Annex 1

PRESS NOTICE ON SERC'S MEASURES TO COMBAT SHORTFALL IN ITS FUNDING

The Science and Engineering Research Council has today (7 February) announced measures to combat the shortfall in its funding for 1991-92 and the effects of this on subsequent financial years.

The recent announcement of the science vote gave SERC £451 million for 1991-92, an increase of £12 million—3 per cent—over the previous financial year.

Commenting on the measures, Chairman of SERC Sir Mark Richmond said: "In putting together these measures, Council has had to make some very tough decisions. I doubt whether any will be popular but they are necessary. They chart the way ahead for the SERC over the next few years.

"On the bright side, we shall shortly be lifting the grants freeze and we will now be able to fund some of the important scientific work that has been waiting to get started; it is important to remember that the great majority of our programme remains in place. It is all of excellent quality."

The measures decided by Council to match its programmes to its allocation were:

ASTRONOMY AND PLANETARY SCIENCE

The funds of the Board will cover many of its existing projects including:

- SOHO/Cluster, the first cornerstone mission of the European Space Agency.
- Much of the existing ground based programme including a share of the 8 million optical telescope in 2 year's time.

At present there are insufficient funds for the Polar Cap Radar, the Gravitational Wave Observatory, the Lyman/FUSE missions and a full portfolio of earth observation instruments for the Polar Platforms. No decision can yet be made on Spectrum X.

ENGINEERING BOARD

Although funds will enable the Engineering Board to maintain much of its present programme of work including support for grants, studentships and education and training, this allocation will still require sharp cutbacks in a number of areas, notably in:

- Information technology.
- The application of computing in manufacturing engineering.
- Engineering design.
- Support provided by Rutherford Appleton Laboratory for engineering applications of computing in universities and polytechnics.

The Board intends to expand its support for Clean Technology.

SCIENCE BOARD

The level of funding allocated to the Science Board cannot sustain its existing programme. In particular it is unable to afford to support two major neutron facilities at The Institut Laue Langevin in Grenoble and ISIS at Rutherford Appleton Laboratory at the present level. To help Council reach decisions in this area a study—to report in October 1991—will be carried out to assess the UK's need for neutrons over the coming years and the most effective way of providing them. Until a decision in the provision of neutrons can be reached, the Board's expenditure on grants and student awards will have to be reduced.

In addition the Council will be unable to pursue proposals for a European Laser Facility within the next few years.

NUCLEAR PHYSICS BOARD

The Council is committed to pay the UK share of the CERN subscription and the associated UK research on particle physics. For the Nuclear Physics Board to remain within its budget, it will have to reduce very significantly its support for nuclear structure physics. To achieve this, Council will have to make plans for the possible closure of the Nuclear Structure Facility at the Daresbury Laboratory. Commenting on this, Sir Mark Richmond said: "This is a leading facility for this type of research in the world which we had hoped would keep the UK in the forefront of nuclear structure science for some years ahead. I greatly regret the shadow cast over this facility, its staff and the community it supports. Council will look urgently for ways to run the facility through 1991 and 1992, so we can honour the first stage of the UK-French Agreement to develop and run the EUROGAM detector array."

To help Council in its further consideration of these issues, a study will be set up to assess the importance of the science in the context of Council work as a whole.

27 February 1991]

[Continued

RESEARCH GRANTS FREEZE LIFTED

The "freeze" on some research grants will be lifted by the end of February 1991. In the Financial Year 1991-92, the Council expects to be able to fund only up to half the number of new grants compared with recent years. The Council greatly regrets the impact of this on the Universities and Polytechnics. Council expects the proportion to improve from 1992-93 onwards.

STUDENTSHIPS

£4.25 million has been earmarked in each of the planning years to support an increase of £400 in the studentship stipend.

COMPUTING

Council has had to reduce support for central computing facilities in real terms. Priority has been given to protecting supercomputing facilities and networking services provided by SERC for the academic community.

CORPORATE PLAN

Council agreed to publish its third Corporate Plan in Autumn 1991.

Examination of Witnesses

SIR MARK RICHMOND and DR A E HUGHES, Science and Engineering Research Council, called in and examined.

Chairman

1. My Lords, perhaps we should make a start. Our first witness is Sir Mark Richmond. Sir Mark, thank you for joining us and for providing at such short notice outline answers to our specimen written questions. May I also welcome Dr Hughes. As you know, Sir Mark, we have mounted this urgent and, I hope, speedy inquiry, not because money for science is less than we would like (that is usually the case), but because there appears to be an immediate crisis in the operation of the funding process, especially as it effects the largest of the research councils, namely the Science and Engineering Research Council over which you preside. For the record, my Lords, I think I had better declare that I have an interest in the matter, insofar as some 20 years ago I occupied Sir Mark's position when, however, the Chairman's task was somewhat easier. If I may begin your examination myself, Sir Mark, I would like to hear from you in simple language whether there is, indeed, a short-term crisis, as distinct from a chronic shortage of funds, and, if so, what it consists of. I would further like to ask you what has caused it, whether poor management on the part of the SERC, or the nature of the Government's budgetary process, Treasury rules and so on, or whatever else. If you would also like to say something by way of general introduction we should be very pleased to listen to you and, of course, Dr Hughes also.

(*Sir Mark Richmond*) Thank you, my Lord Chairman. Perhaps we should just begin by setting the scene. I think the more olympian questions that you ask perhaps we could leave to the end; maybe they will come out in discussion. I think I should concentrate really on the more precise questions about the financial situation at the moment and how it has arisen. At around October 1990 we revised our financial position and came to the conclusion that,

as near as we could estimate it, we would need under the public expenditure outcome for 1991 92 a sum of about £40m in order to maintain our programme. That, of course, was an outcome that was not wildly unreasonable, given the fact that in previous years the public expenditure settlements have been £27m or £28m last year and nearly £40m the year before. I can give you precise figures in a written document afterwards if that would be valuable. Therefore, the programme at £40m was larger than perhaps the gathering situation in relation to public spending in the UK warranted but, nevertheless, was not wildly out of line with the possibilities. Of course, in a situation like that a great deal does depend on the extent to which you can accommodate any shortfalls that arise. It has to be said that part of that £40m was taken up by the inclusion of some shadow cuts to the tune of about £10m. Those shadow cuts were deployed before the ABRC and, indeed, they were implicit, as it were, in the advice that went forward to DES.

2. Forgive me for interrupting, but could you explain what you mean by "shadow cuts"?

(*Sir Mark Richmond*) It is an item which is put in the accounts which you aim to save in the event that increases in funding are not adequate to maintain the programme. There was a figure of £8-10m in that area. The £40m was therefore also made up by an over-run of international subscriptions of about £2m, unexpected spend on student fees which, in the SERC area, have become particularly buoyant (the recruitment of students had become particularly buoyant in the year), but the main factor that caused difficulties was the under-indexation for the rate of inflation. Of the £40m we reckon between £26-28m was attributed to under-indexation, and part of this would have been because of under-indexation for salaries, and part of that would have been

27 February 1991]

SIR MARK RICHMOND
and DR A E HUGHES

[Continued]

[Chairman Contd]

under-indexation for the general costs. Since October of 1992 there are certain additional items that have become apparent. The UK's net national income value has increased and, therefore, the CERN subscription has increased, and we face in 1991 an unexpected requirement for a further £3.6m. That actually would tend to increase the £40m to nearer £44 but, on the other hand, there have been some other adjustments on the other side, the ESA subscription for example dropped marginally and there are a few other elements, so the figure we remained with was about £40m. It was against that background that we heard the outcome of the public expenditure exercise for 1991/92 which gave the SERC £12m as against the £28m last year, and I think about £38m the year before. That is the heart of the problem. This means that we have to call in shadow cuts, as it were, because the total sum is inadequate to confront the volume of our activity. That is a brief summary of the situation as it is at the moment.

3. Could you just make very plain where the shadow cuts will fall as you see it at the moment?

(*Sir Mark Richmond*) The way in which the SERC has to respond to the situation of course is a cut in volume. In the nature of our portfolio of work there are some very big commitments to international agreements which are very, very difficult to cut quickly; there are commitments to large facilities of one kind or another, pieces of machinery, which are also difficult to cut quickly; therefore, since we must, under the terms of annuality, come down to our volume very rapidly, there is no alternative but to cut into the grant line and the studentship line that the SERC supports. Our strategy, which we do not like because it is moving in a direction opposite to the way we would want to go, is in the first instance to cut back on studentships and on grants in the first year, and then in the second year and onwards to try to make adjustments in the more inaccessible parts of our programme, to re-charge the studentship and grant line. It is quite a complicated exercise to undertake. It does mean that in the year that is coming, 1991/92, we estimate that we will only be awarding in the form of grants round about 40-50 per cent of what we would normally expect to award and, as far as studentships are concerned, we would expect to award only about 85 per cent of what we would normally expect to award. There is a point I think I must make there: those are the figures for the new commitment; the carry-over of commitment from previous years means that we actually will still be spending somewhere about 97-98 per cent of what we were originally expecting to spend on grants, and the very high figure there is some measure of the overheating of the SERC economy.

4. By "annuality" you mean the fact that you are supposed to spend all your money in one year, except for some very small carry-over?

(*Sir Mark Richmond*) The annuality rules are very clear—we cannot carry any deficit forward. We

are in the SERC allowed to carry surpluses forward to the tune of 2 per cent of our current spend, i.e. not including capital items, and it is about £8m.

(*Dr Hughes*) I think, my Lord Chairman, that the point Sir Mark is making about grants is slightly different. We must distinguish between the actual in-year spend on grants and the number of new commitments we can make to new grants in a given year.

Chairman] I hope you will return to my so-called olympian questions before you are through, Sir Mark. May we start by talking about the stresses and strains produced by big science, of which we have to distinguish two parts: big science as such and large facilities for small science, to use the jargon. I would like to ask Lord Carver to come in on this because he has done a relevant study.

Lord Carver

5. Sir Mark, I think you are on record as saying that about 130m out of your total goes in this field, of which nearly half is CERN. Could you just elucidate on the CERN situation? What I understand is, your subscription to CERN has been falling in the last two or three years and it now looks like going up. I do not quite understand whether you get straight money from DES to cover subscriptions? Has the Council not gained perhaps in the last few years while subscription has been falling, and then finds it going back again to about what it was three years ago?

(*Sir Mark Richmond*) I think, my Lord Chairman, in response to that question I did put in, in the written material I submitted, a figure, figure 1, and I assume members of the Committee have that, which is the CERN expenditure in cash prices from 1975/76 through to 1995. It is this curve here. You will see that in 1987 the cost of CERN was beginning to escalate very rapidly and the Government undertook a review of the CERN agreement. That resulted in a rather sharp cutback in the UK spend, which you will see on the curve. The thing that, of course, alarms us is that the cost in cash terms is beginning to rise again. Indeed, the rate of increase is not so different from what it was before the step function of 1987. We get no specific money from the DES to pay the CERN subscription. The spend is not in any way ring-fenced, indicated or otherwise directed. We have to make provision for that subscription as well, of course, as subscriptions generated under the terms of other inter-governmental agreements, not an inter-agency agreement, and this has to be accommodated within our planning. One of the difficulties we have is that increases may arise by all sorts of unsuspected routes. The most recent is inflation in Switzerland and, for the first time in living memory, salary disruption and cost of living awards. But for the more detailed part of that I would turn to Dr Hughes because he has been more intimately involved in CERN over the years.

(*Dr Hughes*) I think you are correct in saying, Lord Carver, that the fall in the CERN subscription

27 February 1991]

SIR MARK RICHMOND
and DR A E HUGHES

[Continued]

[Chairman *Contd*]

in a sense did give the SERC a benefit during those years; had the subscription remained constant or continued to go up, it would obviously have cost us more. In the event it cost us less than it would have done in those circumstances, so that was a net gain to other parts of the science programme. The reason for the fall from 1988 onwards was a change in the method of calculating the United Kingdom's contribution to CERN as a result of the actions taken by the government that in part caused the formation of the ABROGAM review of CERN. The change in the method of calculation was benefited the United Kingdom, hence it has benefited the SERC. What we have seen since then is that the method of calculation has remained the same, but it is of course based on the costs of CERN itself, which have gone up for the reasons Sir Mark has just said—Swiss inflation, and a 2 per cent increase in the volume of the programme of CERN that was voted by the CERN Council, with the United Kingdom voting against. Also, a component of the increase is because the method of calculation now involves a United Kingdom share based on so-called Net National Income over previous years. Because the United Kingdom's economy was in good shape relative to other countries in the years 1986 to 1988 we are now seeing the effects of that reflected two years forward into a component of the increase that we now have to bear. It is a rather complicated sum, I am afraid.

6. But subscriptions to other international programmes are not done in this way at all, are they?

(*Dr Hughes*) They all have their different method of calculation. In the case of ESA we pay the United Kingdom component again as part of a government agreement that is based on a percentage share. In many of the others we pay a proportion of an agreed budget that is more under our control, because we negotiate the size of the programme directly with our partners, for example for our telescope collaborations. These are on a smaller scale than CERN by a factor of ten or more. We deal directly with similar agencies to the SERC in other countries and we can try to help each other's local in-year funding problems.

7. Would you prefer that these international subscriptions were removed altogether from your budget and dealt with separately, in which case you would not get the sum of money which they represent?

(*Sir Mark Richmond*) Perhaps I can answer that. It is one of the Olympian questions: how does one accommodate the support for it and continuing programmes within the requirements of annuality. There are various ways in which it could be done. The way you are proposing, I think, Lord Carver, is one possibility, which would be to ring-fence the CERN subscription. That could lead to less flexibility in certain circumstances.

Chairman

8. But I have had a large number of letters addressed to the Committee from biologists, chemists, material scientists of one sort and another and so on dealing not with CERN but with the neutron facilities at Grenoble and at Rutherford Laboratory, which are large facilities for small science, where, by the nature of things, you wish to be able to consider their work in the context of all the small grant work you give to a university that does the same thing but they happen to be using a big facility occasionally?

(*Sir Mark Richmond*) That is correct.

9. How could you ring-fence that sort of facility?

(*Sir Mark Richmond*) I do not think it is practical and we do not think we would want to. I think it leads us to another proposition, which is a difficult proposition, but I think in a way the government has to face it. If the government enters into an inter-governmental agreement in areas of science for long-term projects like CERN, for example, I would not be seeking a total indexation or total protection of the spend but I think there must be some more systematic way of feeding into the public expenditure round a measure of the cost increases and some degree of protection.

Lord Kearton

10. I am not very clear. Are these figures purely the Geneva component of CERN?

(*Sir Mark Richmond*) As I understand it, they are the actual contribution. They are the subscription. We actually spend more money in grants for people to use CERN.

11. I was just saying, have you a figure for that, because a number of universities have very considerable programmes in support of CERN?

(*Sir Mark Richmond*) We can certainly provide this figure.

12. Have you any idea what proportion it is? Is it 10 million, 20 million?

(*Dr Hughes*) The grant funding is about £5 million per year; the UK spend on particle physics has been falling over the same period of the graph on CERN.

Lord Dainton

13. May I pursue that for a moment because the consequence of that would seem to me that you have a large subscription to an international facility which is needed by a lot of universities, but the very increase in cost of that facility means the universities have fewer funds to enable them to take advantage of it. That seems to me rather a strange way of running a tea shop.

(*Sir Mark Richmond*) One of the things we always have to be vigilant about is that we do not end up

27 February 1991]

SIR MARK RICHMOND
and DR A E HUGHES

[Continued

[Lord Dainton *Contd*]

paying a subscription and then not having any money for the people to use it. So to take Lord Kearton's point, the spend on the CERN subscription has to be linked indirectly to our spend in CERN.

Chairman] We are beginning to touch on the effect of the big facilities on small science and this is a very important issue, of course, that concerns us. I would like to ask Lord Adrian to come in and explore this issue with you.

Lord Adrian

14. Sir Mark, we all, I think, know in a sense what we mean by small and large science and it is mainly measured in cash terms and is not necessarily related to fields and it goes on both under the aegis of the Research Councils and under the aegis of universities, but perhaps it is more traditional in universities than it is in the Research Council institutes. That is not something that the SERC need contend with. I think what I want to ask is, recognising that you have been blown off course, shall I say, in this matter and that you are having to do things this year which you would rather not do, in the underlying distribution between large and small—and in the various different subjects it has obviously to be a different distribution—are you satisfied that your mechanisms at the SERC get this right and how do you judge whether you have got it right, as it were?

(*Sir Mark Richmond*) That is a large question. Can I first comment on big science and small science because, with respect, I think there are issues there that are not immediately apparent. We have to distinguish big science, which is, to my mind, the payment for a big facility which is used by a relatively small number of people. I suppose an extreme example might be the gravitational wave observatory, where, as an approximation, you are doing one experiment with a very expensive piece of kit. Lord Flowers touched on the matter of facilities used by a lot of people and I think the prime examples there are neutron sources and synchrotron radiation sources. They may be very expensive to run but they are cost-effective because a large number of people use them continuously. There is then the question of small grants, which are genuinely small grants, to people with allocations in the responsive mode. If we look at the balance, yes, we do look at the balance from time to time but we do find ourselves very, very severely constrained by the consequences of a falling budget, and those are, I have to admit, exacerbated by an over-heated economy in that you have to make adjustments all the time to keep the really small in balance with the really large; but your freedom for manoeuvre is very severely constrained. I think over the years there has been something of a ratchet in operation and the much more mechanistic side of the SERC spend is tending to push "large-wards" and continuous efforts have to be made to drag it back. The question as to where the SERC should position itself in this

spectrum of "small to large" is a question we wish to look at in the context of the new plan we are preparing at the moment. But I would put in a further, I think extremely important point, which is that there is terrific pressure from the Community for the SERC to increase it spend at the small end of the spectrum. I think that is partly a manifestation of the collapse of the Dual Support System, where the Community is seeking from SERC to correct the starvation of funds that are flowing for research through the UFC. There is a very complex pattern of circumstances here. One is the continuing suck of resources into the big facilities because of the nature of agreement, but also pressure from the Community, to attempt to adjust things in the opposite direction, to repair damage arising from elsewhere. We have to chart a way to get to a point on the spectrum which I think is the right one. You say, have we got a mechanism: we are looking at this through a small group of people who are constructing our next corporate plan. I hope to have the next corporate plan ready by the summer. It will have to deal with the issues.

Chairman

15. Given the rules under which you are obliged to operate if, for any reason, the amount of money you have to spend on large facilities abroad or otherwise increases—and you cannot make changes in those things rapidly —

(*Sir Mark Richmond*) Absolutely.

16. — the only things that can suffer are small grants and studentships?

(*Sir Mark Richmond*) As we find at the moment.

Chairman] In my day, 20 years ago, Sir Mark, which you would no doubt wish you were in, these things were more or less automatically taken care of by the adjustments made to one's budget in the course of the year.

Lord Dainton

17. As I look at figure 1 of what Sir Mark has put forward that carries me back as former Chairman of the Council on Scientific Policy and to those halcyon days to which the Lord Chairman referred, and to a period when I was Chairman of the UGC. It is about the Dual Support System, to which you have just referred, that I would like to ask a question or two if I may. You said yourself just a moment ago that the Dual Support System was "cracking" I suppose is the word, and it is becoming very difficult for universities to do what they normally did, with laboratories no longer well found, to use that term of art, and not having enough free money in particular to help those as yet unrecognised people who are not in a state of prominence to apply for grants to research councils with any likelihood of success and who have speculative ideas and on whom the future depends. Yet one notices, of course, that the Government has

27 February 1991]

SIR MARK RICHMOND
and DR A E HUGHES

[Continued

[Lord Dainton *Contd*]

decided to transfer funds from the University Funding Council, and PCFC to a lesser degree, to the Advisory Board for the Research Council which will find its way in due course to the Research Council, and the Research Council intend to use that money for, as I understand it, paying a proportion of the overhead cost, the so-called indirect cost. The problem, it seems to me, is when you are under these great pressures, and suddenly you are going to get an influx of money from this other source, with these problems facing you there will be a very great temptation (which somehow you have resist and manage) to use that money (when the university already in a bad position could become worse by the transfer) not to go back into the universities but to resolve these other broad problems. First of all, is that a real dilemma? Secondly, if it is, how in your broad corporate plan are you looking forward to resolving such issues?

(*Sir Mark Richmond*) The question of the deploying of money that may come by this route is a very interesting one, a very topical one, and one that has to be tackled with care. I think the possibility that we would use that money to relieve pressures elsewhere can be controlled. We can set up a self-denying ordinance but it may well be that the money will come with some indication attached, which ultimately will be protected by the Public Accounts Committee, in the way in which it was deployed. I think that some sort of indication of that kind will be applied to the money. The critical question is actually the terms under which universities can claim and are accountable for the way in which that money is then deployed. The situation with respect to the Dual Support System may locally specifically be greatly improved by such a transfer, because, if the rules worked strictly, then the money transferred would then be deployed outwards into the universities to support people who are actually working on the research grants, i.e. the deployment of that money will be much more focused under the new arrangement than it is now. More focused I think it has to be because the Charters of the research councils will only allow us to spend money on a more limited range of matters than, for example, the financial memoranda that govern the UFC. The universities will have to focus their spend much more precisely. That will have advantages in that I think it will very much help the strong research groups. There are those who feel it would have disadvantages in that it would tend to concentrate the high class research in a more limited number of universities, and the bright young men and women who wish to seek their vocational research will have to migrate into the good research departments fairly quickly: In the process I think a significant number of highly motivated young people may be lost to the system.

18. May I just ask apropos of that, would it be open to the universities which are receiving this extra

money in indirect costs — as I understand it, this is to be related as a fixed proportion of the direct costs. Is that right?

(*Sir Mark Richmond*) There is a cohort of admissible headings and basically it will emerge, I suspect, as a proportion.

19. When that gets into the treasure house of a particular university is it open for it to be deployed on that project for the support of students or staff?

(*Sir Mark Richmond*) As far as the Research Council is concerned, we are allowed to support research students for training and research, but we are not allowed to support undergraduate students.

20. I understand that. I am just getting at the point again.

(*Sir Mark Richmond*) The critical point is, what are the rules that govern a university making a claim on the Research Council for money? Who is going to monitor and who is going to control the way in which that money is spent on the research work?

21. I understand that.

(*Sir Mark Richmond*) That is the heart of it, and that is what has to be very clearly stated.

22. The heart has several valves. The point I am trying to get at is, is it possible to relieve some of the problems you say your cuts necessarily enforce on student grants and very small science? Is it possible that some remedy could come from that money which is fed back into universities as indirect costs?

(*Sir Mark Richmond*) I think it would be legitimate to, for example, increase or protect research studentships which are deployed within areas where the Research Council has allocated funding. I think that would be a legitimate charge.

23. That is something you would want to see?

(*Sir Mark Richmond*) I would want to see some protection of the excellence of the research centres.

Chairman

24. Sir Mark, a proportion of your budget goes in the responsive mode in respect of applications from university scientists who want to do something, and you examine it and decide that their work is of merit and you fund it. In recent years a higher and higher proportion of your funds has gone into directed research, research led from the centre in some sense or by committees or something, much of it of an applied nature?

(*Sir Mark Richmond*) Yes.

Chairman] I think that is something we ought to explore also to see whether because of inflexibility or something that is also compounding your difficulties at the moment. May I ask Lord Gregson to follow up on that question.

27 February 1991]

SIR MARK RICHMOND
and DR A E HUGHES

[Continued

Lord Gregson

25. Could I first of all, my Lord Chairman, just remind the Committee that we are talking about the Science and Engineering Research Council. I must say there is a great deal of concern in the engineering community for the position you find yourself in, because at this point in time certainly a number of them think the scientists, because of their big science etc., are pinching their money. Engineering is mainly small projects and short-term projects. It certainly seems to them, and I must say I have some sympathy with the point of view, that in fact this is the easiest part of your spend to attack in terms of recovering your money, not necessarily this year but certainly next year. Could you please just outline what the position is with regard to the engineering part of your responsibility?

(*Sir Mark Richmond*) The engineering part of the responsibility amounts to a spend of about £130m a year, the great majority of which is spent on small responsive mode grants. We have in 1991/92 perforce to make studentships, but particularly grants, the reservoir from which we will draw the funds to balance the books, and the engineering community is hit by that. So a big slug of the spend in the Science Board, the Nuclear Physics Board and the Astronomy Board is much less damaged because the proportion of grant spent on research is less.

26. That, I might say, is of great concern to industry as well because the industry interface with your Research Council is more on the Engineering Board than it is on the science side and, therefore, industry also feels to some extent that the money has been misdirected from their point of view. Since we, as a country, are very dependent on what our industry does in the next few years, it does seem to me perhaps we really ought not to swing it on the Engineering Board, that the Science Board could suffer a bit more than they do?

(*Sir Mark Richmond*) At the moment some protection has been given to the small grants budget in science and in engineering. Can I make a generalisation? What is at the heart of the problem is the maintenance of flexibility in the spend of the SERC. International subscriptions impose an inflexibility: the big machines impose an inflexibility. I am not saying at all we do not want this but —

Chairman

27. Do the directed programmes impose inflexibility?

(*Sir Mark Richmond*) Yes, but so will joint programmes, which are often very beneficial to us because of the gearing with other government departments such as DTI; and a very high proportion of that spend actually flows through the Engineering Board, so I think at the heart of it is how do we maintain our flexibility.

28. I am sorry, may I follow this precise point. Can you remind us what proportion of your total

budget is on research grants and studentships related thereto and what proportion of that is given in the responsive mode, that is to say, not directed by somebody sitting in the centre?

(*Sir Mark Richmond*) Could I intervene on that because, again, just as there is this distinction that is made between large and small grants, there is also a distinction made between responsive and directed. I think again that distinction is a little bit too simple because we have genuinely responsive mode grants where people bid to do work with no very intense framework into which they are bidding. We then, on other programmes, do have some directed programmes which are almost contracts to do certain things. In the middle we have initiatives where the Council will define an area of interest but bids within that area of interest will pay for people and we would fund them in the responsive mode. So I hope your Lordships are clear that directed responsive is not a clear-cut distinction.

29. Would it be unfair to say that only about 10 to 15 per cent of your budget is really available for responsive mode funding?

(*Sir Mark Richmond*) No.

(*Dr Hughes*) May I answer your question of a moment ago, Lord Chairman. We can provide you with a rather complicated diagram which will show you the percentages of the SERC budget spent on grants, studentships, internationals, intramural facilities and so on.

30. But it is that flexible part that suffers in the present circumstances. That is why I wanted to get clear how much it was.

(*Dr Hughes*) In the present circumstances, we are looking into next year and the year after that. What we are seeing, as a result of the position we are now in is a slight change in the direction in which we have been moving our affairs. Over the 1980s the fraction of the SERC budget spent on grants and on studentships has deliberately been increased at the expense of the larger components of the programme, the traditional 'big sciences', if you like. Over the next couple of years we will see a small down turn in the trend, for the reasons Sir Mark earlier about the pressures that result from the more fixed parts of our budget.

Lord Butterworth

31. Could I follow up one point before we leave it. Would I be right in saying that when you are concerned with the management of priorities in research that is restricted to directed research, and that in the responsive mode and in the area of initiatives the management of priority would have little place?

(*Sir Mark Richmond*) The management of priority within initiatives is still significant in the sense that you will decide, as an objective, that you will have an initiative in adhesives, for example, and there will be a certain amount of management

27 February 1991]

SIR MARK RICHMOND
and DR A E HUGHES

[Continued]

[Lord Butterworth *Contd*]

direction in the way in which that is deployed, but it will not be as strong as it would be if you were going to fund something in a certain specific area. So with that proviso the answer is yes.

Lord Gregson

32. Can I finish the question I wanted to raise. I have no doubt you are aware, Sir Mark, that over the years there has been considerable agitation for a separate Engineering Research Council, quite separate from the Science Research Council. Of course, the position you now find yourselves in has given rise once again to a considerable surge of opinion within the engineering community that this ought to be the case, that, quite frankly, engineering ought to be decoupled from science and especially from big science. Would you like to comment?

(*Sir Mark Richmond*) I would like to comment on the first bit, ought there to be a separate Engineering Research Council? I would be strongly against that. The direction I would want to go is rather the opposite. It seems to me that engineering—or maybe it is better to call it technology—is embedded in everything the SERC does. At the moment we have an Engineering Board. I think it would be much better, frankly, if the engineering component was an integral part of the areas of science that the SERC supports. It is not accidental, I think, that the design of a telescope recently attracted an engineering award for excellence. So I think I would not go in the direction of an Engineering Council. If, however, with these large facilities this flexibility question does impose constraints, then the unfortunate sidewash affects large parts of the Council's business, particularly the small bits dominated by small grants.

(*Dr Hughes*) I think it should be said that we have not treated the Engineering Board any more harshly (if I can put it that way) than the Science Board in the current planning exercise.

Lord Taylor of Blackburn

33. Are you getting that over to engineers?

(*Sir Mark Richmond*) No, I think probably not. There is also a further difficulty or further complication in that the Engineering Board itself has decided, within this difficult exercise that we are carrying out to cut back quite sharply on the support for certain kinds of engineering, and to redeploy the money on other types of engineering. That is also producing further responses in the Engineering Board in that they tend to identify with the global situation in the SERC, whereas it is a local decision of the Engineering Board.

Lord Kearton

34. I have got the impression that through circumstances you are locked into great rigidities in managing the programme, which is the source of all your problems, but the actions you are taking seem to be increasing the rigidities. You are talking about

maintaining centres of excellence, the assumption being that a centre of excellence remains a centre of excellence indefinitely, whereas it does not?

(*Sir Mark Richmond*) I think that is a real problem. I think you would have to ask someone like Dr Rees, my colleague from the Medical Research Council. They over the years have had the greatest difficulty in discontinuing some of their initiative funding in the form of units. I think one of the big management problems we have, and it is a grand global statement, is against continuously falling resources in real terms to manage the system, to maximise flexibility, and there are all sorts of constraints on us that make it very difficult.

35. Do you think the formation of the IRCs is going to impose further rigidity on the system?

(*Sir Mark Richmond*) I do. Again the IRC lock up a considerable amount of resource for a considerable amount of time.

36. And they are really speculative investment?

(*Sir Mark Richmond*) Yes, but I think the Research Council actually has to get itself into some areas of speculative research, otherwise you can run on almost in a mechanistic way.

37. Perhaps I used the wrong word. To react to the situation by cutting off your growing tips, as it were, with all the fresh applications from new people with new ideas, to cut back the studentships and so forth, seems to me to do maximum harm to the system?

(*Sir Mark Richmond*) I agree with you. I tried to say it was a major response to *force majeure* to adopt it in 1991-92, but the corollary is that in 1992-93 and thereafter we must make cutbacks in the big programmes in order to recharge then; and if we cannot do it I will myself feel I have failed very significantly.

38. But in the days when I ran large laboratories we tried to have a cushion in allocating money at the beginning of the year so that we could meet unexpected circumstances, but the way you run the system it seems to me you have absolutely no freedom there at all?

(*Sir Mark Richmond*) It is a consequence I think of the system of annuality. The question of shadow cuts, which I think has been quite serious in the present SERC situation, is not an uncommon way of dealing with this problem. When you come to the year end you do have problems sometimes of trying to deploy resources extremely quickly. All of us wish to deploy that resource if we have to do that effectively, and not to the people who happen to be able to process the invoices fastest.

Chairman

39. As I understand it, the secret is that you do your annuality sums and if they do not come out right you must have something in reserve, something

27 February 1991]

SIR MARK RICHMOND
and DR A E HUGHES

[Continued]

[Chairman Contd]

that you can scrounge to make it right. This year it has fallen on the most sensitive things in the Research Council activity?

(*Sir Mark Richmond*) Absolutely. Because of the balance of the inflexible funding principle in the SERC as such, the first thing you can reach for is the flexible funding which is what you want to protect.

Baroness Platt of Writtle

40. You mentioned the overriding importance of a committed resource to CERN, which is an international payment. Is that related in any way to exchange rates? Do you pay in pounds or are you further embarrassed about it?

(*Sir Mark Richmond*) No, we are further embarrassed by exchange rates. The subscription is paid in Swiss francs and we allowed to buy forward but we have to make decisions as to whether we buy forward and, having made the decision, I think I am right that we cannot change it. In other words, we cannot speculate in the market.

41. Would it be better if we were paying in pounds?

(*Dr Hughes*) It would have reduced our problems, yes, because the exchange of the pound against the Swiss franc has moved to our disadvantage.

Lord Gregson

42. The MoD faced with this problem some five years ago did negotiate with the Treasury to increase the under fund situation of 5 per cent. This is the accountancy of the 17th Century, not the accountancy of the 20th Century. Would it not make sense, therefore, to negotiate a larger balance for the year? Would it not make all the difference to your planning?

(*Sir Mark Richmond*) At the moment we have a carry-over allowance of 2 per cent. I think we are alone in the research councils in having that. It is a reflection of the fact we do have these big international commitments. We have £105 110m of international commitment, and the next research council I believe is the Medical Research Council with about £5m. If you ask, would I like to have a bigger margin of carry-over then the answer is, yes. I think it could be very helpful and it could also actually help in another problem we have, which is planning long-term commitments against the see-sawing size of public expenditure settlement. The onus on us would be—and the Community would say, “You may be wasting money”, and the Treasury would say, “You may be wasting money”—that in a good year we would have to take a view and maybe keep a fund against bad years. 5 per cent, something in the order of £15-20m, I think would be adequate.

Lord Whaddon

43. Sir Mark, you said at the beginning under-indexation was a problem?

(*Sir Mark Richmond*) Yes.

44. I noticed that between 1990 91 and 1991 92 you have an increase of 3 per cent, whereas the index of inflation is 9.3?

(*Sir Mark Richmond*) Yes.

45. I heard it said also by other branches of science, and in particular medicine, that their cost increases are considerably greater than the general index as they enter more complex fields. Do you feel that the general cost of living index is a true reflection of your cost increase, or is it not a true reflection or an over-reflection?

(*Sir Mark Richmond*) It is a significant under-reflection of the increase of the true cost.

46. In fact you are disproportionately affected?

(*Sir Mark Richmond*) Yes, I think so, because the sophistication of science is always increasing. Much sophisticated scientific equipment is effectively traded in international currency because it is so worldwide. Costs of periodicals and things like that, which may seem trivial items but are very expensive, they tend to be costed in international currencies; the Deutschmark is particularly favoured at the moment for obvious reasons. We are seriously under-indexed, if for no other reason because of the difference in the Treasury's deflator and the actual costs.

47. Do you have any doubt in your head as to the amount by which your true index exceeds the general index?

(*Sir Mark Richmond*) It is difficult because it varies very much from area to area. We estimate that the under-indexation in 1991 92 in considering cost, is costing us somewhere between £10-15m.

Lord Taylor of Blackburn

48. How do you decide, in view of the cuts you were telling us about, your rules of priority?

(*Sir Mark Richmond*) Since time is of the essence, it has to be decided by a group of people who will look at the evidence and make recommendations. The route we have used is to get each of the boards to establish a small committee of independence usually from industry and commerce, i.e. in general not people who are benefitting from the programme, and ask them to come forward to the boards with their best use as to what should be done within the programme. The Council of the SERC have also established such a board, again primarily independent but not exclusively. They receive the suggestions from these board groups and make recommendations to the Council. I am afraid, however much one would wish otherwise, the structure of large boards and a large council does not easily accommodate the need for rapid analysis an decision taking in circumstances like this.

27 February 1991]

SIR MARK RICHMOND
and DR A E HUGHES

[Continued]

Lord Butterworth

49. Following upon this, it seems to me that this question of priorities could be crucial. Your explanation was graphic, but do general principles emerge by which priorities are determined? From all these committees that have been set up, the committee of the main board and so on, is there anything we could actually see—could you send us material—about how the principles governing priorities are emerging in the SERC?

(*Sir Mark Richmond*) I will try. I think it is an extremely good question. What emerges are a number of issues. For example, the balance between domestic and international; the balance between small and large with the caveats I have raised; the balance between directive and responsive with the caveats I have raised; the positioning on the spectrum: pure strategic applied.

50. It is sometimes said, is it not, that collectively we are bad at the management of priorities in areas of this kind, so if there were papers which the Committee could see where we had a shot at this kind of management it would be very helpful to us, I feel?

(*Sir Mark Richmond*) I think the conceptual way to handle this is to try to describe the issues on which you have to reach a judgment—the number of spectra of description: pure applied, responsive directed, and all the rest—and then decide where on that spectrum you position the council in each case. You end up with a matrix. That is really what I am trying to begin now with a view to coming up with some answers to question within a framework that makes sense. The disaster of an under-funding situation like this, in that you are thrown into fire-fighting. I want desperately, while the fire-fighting is going on, to start a proper analysis of some of these questions. I am not saying it has not been done in the past but it is a very difficult question.

Lord Dainton

51. All that you have been saying this morning is simple in the sense that your money is declining in real terms. You have large fixed sums which are inclined to go up in terms of our currency and, therefore, there is a gearing effect on all sorts of other activities. One thing that really worries me about this is that the inevitable consequence, it seems to me, will be that science, in a sense, will be downgraded, there may well be less studentships and so forth and this feeds back into the system and there is a general gloom that sets down. It seems to me there is a very strong case for at least maintaining small grants, the seed corn, the new people coming through who are going to feed through into industry, and if we lose those we are losing generations ahead. Will the Council be considering making a very strong bid on those grounds for what is a very high priority whilst it is doing this long-term consideration?

(*Sir Mark Richmond*) The answer is yes and I would also add the fact that the studentship line is the least damaged of all our student lines.

Chairman

52. Sir Mark, may I explore one final issue with you briefly before we let you go. We have not talked very much about the public expenditure system as a whole within which you have to operate, as all agencies of government do. To what extent has the public expenditure system failed you? To what extent has the Advisory Board for the Research Councils, which advises the Secretary of State on how much you need and how much he should give you from whatever he gets, failed you? To what extent has the Secretary of State failed you by perhaps rejecting that advice in part and giving money to schools instead, which he has an absolute right to do and it is a very important thing that schools be properly supported, after all. Can you give us any guidance at all on the extent to which you feel the system has failed you? I realise this is a slightly sensitive thing to have to do.

(*Sir Mark Richmond*) Not only is it a sensitive question—and I have not been deflected by that in the past—but what I am more worried about is that I have not actually had the experience of a year of operation of the system. In other words, in ten day's time the heads of Research Councils and others will be gathering in ABRC to bid for some of the flexibility fund items in the next public expenditure round, and I will be very interested to see how that works. I feel on the basis of very short experience that there are some shortcomings in the way the ABRC is working, but I have to say also it is feeling its way into its new role. I am not convinced that the ABRC necessarily takes enough notice of the concerns of government departments other than the DES. Indeed it does not take enough notice, for example, the views of the Department of Trade and Industry on support for strategic research in relation to engineering. The ABRC has no assessors from the Department of Trade and Industry or from the Foreign and Commonwealth Office, and yet the CERN subscription and the extent to which we rough up our colleagues in Europe by our actions is of deep concern to them. One of the areas that in a sense may be a problem—I do not say it is yet but it may be; it depends on the outcome—is the extent to which ABRC is sensitive to issues of that kind, which are rather more economical and political, when they are advising the Secretary of State for Education and Science on the allocation of cash for research funds. This is an area I will be watching and I would be very interested to read in due course, if you come to ask Sir David Phillips questions in this area, what his replies might be.

53. Thank you very much. We are very well aware that you only recently took up office—was it last October?

(*Sir Mark Richmond*) It was last October, yes.

27 February 1991]SIR MARK RICHMOND
and DR A E HUGHES[Continued

[Chairman *Contd*]

Chairman] You seem to have walked into quite a package of problems for which you were not responsible although you are now, but we would all wish you well and wish the SERC well and we hope

that our efforts may eventually help by leading at any rate to greater clarification of the problems at the present time. Thank you very much, and thank you, too, Dr Hughes.

27 February 1991]

[Continued

Memorandum submitted by Sir Peter Swinnerton-Dyer

The Committee are asked to treat this as a personal statement, since there has not been time to consult members of Council.

The UFC's distribution of basic block grant for 1991-92 is intended to fund some 303,700 home and EC students; the corresponding resource (that is, basic block grant plus fees for those students) is £2,048 million. In the Council's allocation process, £1,293 million of this is distributed on teaching based criteria, £680 million on research-based criteria and £75 million as special factors (largely to allow for higher pay rates and other costs in London). In percentage terms the T:R split is 65.5:34.5; it has not varied much since the current resource allocation process was introduced in 1986.

There is no satisfactory way of determining how much of their resources (in the sense above) universities spend on research—primarily because of the problem of allocating academic salaries between teaching and research. But the T:R split given above can be regarded as a reasonable surrogate. If a research project cannot attract outside support (as is true, for example, of most small projects and nearly all projects in the humanities), its entire cost has to be met from general funds. Under the dual support system, block grants also meets the universities' share of projects supported by grants from Research Councils—the provision of well-found laboratories, the salaries of academic staff and a majority of technicians, adequate library and computing facilities, and so on. Projects funded by charities have by long custom also relied on the free availability of these facilities.

The declared intention of DES, in transferring money from the UFC to the Research Councils, is that Research Council grants will cover more of the associated infrastructural costs of the research projects they support. The money will still flow to universities, but through a different channel. The change is therefore intended to have no substantive effect, and it appears that it is being done primarily in the interests of administrative tidiness.

Even if this is how it turns out, the change will present problems for universities because it will produce bigger year-on-year fluctuations in the income of individual universities. It would not be sensible, for example, for the number of research journals a university buys to vary from year to year according to the value of the research grants it attracts; yet this would appear to be one of the implications of the DES policy.

DES have also not revealed how they are going to ensure that the money transferred actually does flow back to the universities. On current evidence, very firm controls will be needed. SERC's financial overcommitments, in the last year of Sir William Mitchell's chairmanship, took place at a time when they were confidently expecting that some £50 million per year would be transferred from the UFC to them, from 1991-92 onwards. If that transfer had taken place, the extra money ought to have been added to grants to universities, and SERC ought to have carried out exactly the same painful programme of cancellations and closures that they are now committed to. It is difficult to believe that that is what would have happened.

Examination of witness

SIR PETER SWINNERTON-DYER, Chief Executive, Universities Funding Council, called in and examined.

Chairman

54. The problems we have been discussing with Sir Mark Richmond have serious implications obviously for research in the universities, because we have heard that university research under the dual funding system is partly funded by the Research Councils and partly by the Universities Funding Council, of which Sir Peter Swinnerton-Dyer is the Chief Executive. Sir Peter, thank you for joining us and thank you for your written statement, which we quite understand has to be a personal one owing to the short notice that we gave you. I think we should like to explore two main issues with you: first, what effect short-term funding difficulties are likely to have upon the universities and what responsibilities you have for protecting them in such circumstances; secondly, whether the position would have been even worse had the original intention to transfer a significant proportion of UFC funds to the Research Councils not for some reason been postponed. You

touched on this in your own short paper to us but if there is anything you would like to add by way of introduction, please feel entirely free to do so.

A. No, I think I have put into my paper all I wanted to say. I have done my best to answer those of your questions that relate to the dual support system but the difficulty is that the answers to a number of those questions depend on decisions which have not yet been taken.

55. Not yet been taken by you or by somebody else?

A. Partly by us, partly by the Secretary of State, for example, because we cannot decide how to remove the amount that is being transferred from us from what we would otherwise give to individual universities until we know how much it is and what assurances there are that that money will, through a different channel, go back to universities. In any case, now that that transfer is not happening until August 1992 it is not unnatural that the Council has

27 February 1991]

SIR PETER SWINNERTON-DYER

[Continued]

[Chairman *Contd*]

deferred deciding what to do about that until it has a new Chief Executive with some experience of the office.

56. We are aware you are shortly to retire, Sir Peter, and we wish you well in your retirement when you get that far. It is obviously a personal opinion you will be giving but would you like to say a word on what the likely effect of this short-term crisis that we are talking about in this inquiry will be on the general financial state and research health of the universities?

A. The short-term crisis is predominantly a Research Council crisis and it would seem that it will cut the number of research studentships to some extent and the number of research grants to people in universities rather more markedly. It will, therefore, reduce the amount of research that can be funded. It is quite likely that some of that research will still go on and universities, particularly those whose financial control system is weak, will find themselves spending more than they turn out to have in the way of income. There has always been a tension between what departments feel they inescapably have to spend and what the centre turns out to be able to give them.

57. But there have been threats, have there not, of closing down certain large and expensive facilities to make things easier for research grants and studentships and so on?

A. Yes.

58. But if it is something done in response to a short-term crisis, which is what we are dealing with, that has a long-term effect because you never re-open it?

A. Yes.

59. Do you face that with equanimity?

A. No, but I think these are still threats on the research council side to close. Daresbury, for example, is their decision. But the academics who work on nuclear structure will suffer very greatly in their research if Daresbury is closed.

60. They are your responsibility?

A. They are our responsibility but we can really do nothing for researchers who are totally dependent on a very big instrument. The research councils have to provide that. But may I go back to your phrase "short-term crisis". If it were only a short-term crisis I do not believe that there would be the sort of closures that are being talked about. What we have is the sudden recognition of a crisis that has been building up for a long time. One expedient after another has postponed the day of reckoning, the shortfall of income, and the expedients have run out in what was anyway a rather unfavourable year. It would be a great mistake to think that it will all be all right in two or three years time and we just have

to bridge this gap. We have been following that policy all through the 80s, and in retrospect crisis actions should have been taken much sooner.

Lord Dainton

61. The nature of this crisis, is it a crisis of under-funding on both sides of the Dual Support System?

A. It is in a way a crisis of under-funding; but it can equally be seen as a crisis of over demand. There is more good research waiting to be done than one can possibly expect any government in these days to fund. The research councils, particularly the SERC, have not really taken this on board. They have not addressed the question: what branch of research do we have to get out of?

62. This seems to me a very important point for the future. Is Sir Peter saying, on the basis of his extensive knowledge of this matter, that there is an inbuilt expansionist tendency within science, engineering and technology which increases costs and which cannot be matched by public expenditure, and therefore we have come to the limit and we now have to face these tough decisions?

A. Yes, I am saying that.

Lord Butterworth

63. Is it also the case that you are saying we have reached the stage when we ought to pay much more attention to the management of priority in research?

A. I would like to think so. I am not confident that anybody, however omniscient, let alone any committee however omniscient, is all that good at judging priorities. I would have some hesitation therefore in saying priorities should be managed centrally. What I think it is much more important to pay attention to are the medium term financial prospects. Can we get through this year all right, because after all the Secretary of State has promised us wonders next year, is no longer a satisfactory train of thought.

Chairman

64. Committees and individuals are concerned that if they do not settle priorities politicians will, and that would be worse, would it not?

A. No, I do not think that is so. You can set priorities by a deliberate overall survey of the whole of science, which is a deliberate action, or you can turn out to have set priorities by taking a lot of small decisions which add up to a policy; and the small decisions empirically seem to me to have turned out better.

65. I would like to put one last question to you if my colleagues will be generous to me. I was trying to get at the following thing: you the UFC are responsible for the health of the universities as whole institutions. The research councils are responsible

27 February 1991]

SIR PETER SWINNERTON-DYER

[Continued

[Chairman *Contd*]

for the funding of the bits and pieces of the universities which are particularly useful to them as merited in their eyes?

A. Yes.

66. If there is a funding crisis so serious that it affects the health of the universities in a wider sense than just bits of research here or there then does it not follow that they and you should be working in the closest possible co-operation in trying to solve this problem? If the answer to that is, yes, can I ask you to what extent you the UFC have been consulted about the handling of the present crisis?

A. The answer to your first question is, yes. The UFC has virtually not been consulted at all on the handling of the present crisis, but it must in fairness be said that the drawing apart of the ABRC and the UFC, which has been the deliberate decision of both parties over the last couple of years, was started by the UFC. The UGC had substantial representation from the research council system as assessors on it. It was Lord Chilvers' decision when he became Chairman of the UFC that there should be no representation of that kind whatever. I think the fact that I ceased to be a member of the ABRC has to be viewed as a consequence, a mirror image of that.

67. Do you regret that?

A. Yes, I do.

Lord Dainton

68. This destroys a whole line of essential communication?

A. Yes.

69. Could I make a point now. In your letter you refer, of course, to the transfer of funds to which my Lord Chairman has also hinted. For those who are not familiar with it I should perhaps say that, as I understand it, the idea of government is to transfer the sum to the research councils from the UFC to enable the research councils to pay some of the indirect costs of the research associated with grants which the research councils make to universities. I ask myself, and now want to ask you, a particular question: that money in any case is part of the overheads, as we understand it, associated with these things, so that it is taking money from one body which would have supplied it anyway through another route to another body to spend in a way which was originally intended. Is that a misunderstanding on my part? What are the advantages of this transfer from either the research council side or the university funding side? How does this ameliorate a difficult situation?

A. If everything goes as Government expects the consequences would be exactly as you have said and it would essentially be a procedural change. Even so, it seems to me to have minor disadvantages in that it will reduce the flexibility that the universities have in spending the money. A great deal of work is being spent in trying to calculate how much should be

transferred and trying to set up a new system that will eventually, with luck, work about as well as the old one. The Secretary of State and, indeed, his two predecessors have not chosen to give any positive reasons for this change. They have not chosen to reveal their thinking publicly; but it is no uncommon thing for the DES not to reveal its thinking publicly. I have seen no claimed advantages for the change and, of course, it is possible that not everything will go in the way the Secretary of State anticipates, in which case there might be serious disadvantages. As I have implied in my paper, I think it might have been disastrous if the change had taken place in 1991 instead of 1992.

Lord Adrian] There was, I thought, an implication in what Sir Mark Richmond said in this particular context that the money that will be transferred from the universities to the research councils would be better directed or more in focus were it used by research councils than it is in effect focused by the universities who now receive it. I think there was an implication that the universities did not spend it entirely in the way that it was supposed to be spent.

Chairman] Polytechnics echo that very strongly.

Lord Adrian

70. Indeed. I wondered what comment you would make on that?

A. Better directed, I think, means more sharply earmarked. Whether the results will be an improvement depends on whether you think the judgment of the SERC on how it should be spent is better than the judgment of individual vice-chancellors. It is not clear to me that some of the necessary infrastructure will, in fact, be supported under these new proposals. I am particularly concerned about library provision and things like that.

Lord Kearton

71. Do you think the link between the ABRC and the UFC should be restored?

A. Yes, I do.

Lord Kearton] I did not see any logic in the original split, frankly.

Baroness Nicol

72. In your submission you say: "DES have also not revealed how they are going to ensure that the money transferred actually does flow back to the universities." Then you say very firm controls will be needed. What form do you see those controls taking and who will impose them?

A. I am not clear what form they need to take because I do not entirely see how it can be contrived. The Secretary of State has an unlimited power to issue directions to Research Councils, though it is a power which is virtually never used, and he could, presumably, issue directions which would have to cover not merely the fact that this extra money goes to universities but the fact that the total spend of the Research Councils in universities should not go

27 February 1991]

SIR PETER SWINNERTON-DYER

[Continued]

[Baroness Nicol *Contd*]

down, otherwise there is a risk that they will say, "This money goes to universities but by coincidence we were going to cut down the proportion of our old money that went to universities." To judge from Sir Mark Richmond's evidence, he would do his best to follow the Secretary of State's intentions but this coming year represents so considerable a crisis for the SERC that he would be under extraordinary pressure to divert the money temporarily.

Lord Taylor of Blackburn

73. May I take you back to the question regarding priorities, which is to me very, very important indeed. You told us what you would like, you told us you were not happy about the committee structure designing priorities and you told us about the way it can be done. Which way do you do it?

A. The UFC does not deal all that much in priorities because at the end of the day it works out a block grant to give to each university. The UGC dealt considerably more in priorities because it saw itself as a planning body as well as a funding body. Lord Chilver has said publicly that the UFC is a funding but not a planning body. I am pretty clear that any higher education funding body would be less prescriptive about priorities than a Research Council normally is because we would feel that individual vice-chancellors, even if they are stupider than us, have a great deal more detailed knowledge of their own universities and will come to better decisions.

Lord Carver

74. Sir Peter, how much of all this problem you face and the Research Councils face, too, is because increases in salaries are not being met by increases in grants? We are constantly subjected to a chorus from the scientific community that scientists in this country are not paid enough and are not paid anything like enough in comparison with other countries, which causes the brain drain, so presumably you welcome increases in scientific salaries? If there are going to be the increases there should be, and if the amount of money available to you and to Research Councils is not going to be greatly increased, do you regard with equanimity the idea that you will have fewer scientists?

A. No, I do not regard that with equanimity but that is, in effect, the government position. Ministers must be perfectly well aware that salaries are a major component of university expenditure and how many people are employed by universities is, to a large extent, determined by how much money the universities get. In every recent year the actual increase in salaries has outstripped what we calculate the DES put in for that purpose. What DES actually put in they do not tell us.

Chairman

75. Could I put a supplementary to that, Lord Carver. I would like to have your opinion about what we heard from Sir Mark, that the Research

Councils are in difficulties with salary settlements which really they play no part in making. They pay salaries of people who work in universities. They have to pay university rates. Those are negotiated by the universities, not by them, and they have to pay their staff rates which are essentially settled by the Civil Service machinery, not by them. Do you see any problem arising if personnel funded by the Research Councils working side by side with the university staff on the same problem may be paid on different salary scales from university staff? Can one decouple this system to some extent so that Research Councils have a greater say over how their money goes?

A. I think one could decouple the system to some extent. There will obviously be problems. There will obviously be frictions but it seems to me the frictions will be less severe than those which now occur in a laboratory where the MRC funded research student is paid something like half what a Wellcome funded research student is paid.

Lord Dainton

76. Could I come in here. I have just seen the circular letter which has gone out from the UFC and at the bottom of the first page it makes the statement: "The Secretary of State has made it clear that he looks to institutions to make further efficiency gains" If you look at that paragraph you here have two sides of a dual support system in which the efficiency gain on the university side has to be very much greater than on the Research Council side, or, to put it another way round, it is indicated that you are expected to have an inflationary index which is at least 1.5 per cent lower than that of the Research Councils. Is not that sort of imbalance bound to lead to great strains if the universities are somehow to maintain support for research grants from Research Councils?

A. I think your figures this year are wrong. We are expected to have an efficiency gain of 1.5 per cent.

Chairman] Are we talking about the same year?

Lord Dainton

77. For 1991-92?

A. For 1991-92 we are expected to have an efficiency gain as against general inflation of 1.5 per cent, so that we are expected to pay 4.5 per cent more for the same things than we do in 1990-91 on the basis that inflation will be 6 per cent. The SERC, as I understand, is expected to pay only 3 per cent more in 1991-92 than it did in 1990-91, so it is actually this year worse off than we are, having been better off for the previous couple of years.

78. But if on the whole research in universities depends upon roughly equal input from both sides, the universities and the others, they ought to be in harmony, ought they not?

A. They ought to be in harmony unless the Secretary of State thinks that a larger proportion of

27 February 1991]

SIR PETER SWINNERTON-DYER

[Continued]

[Lord Dainton *Contd*]

the research in universities should be research funded by the Research Councils or industry and a smaller proportion that funded out of block grants.

79. This really goes back to the problem which arises when you decouple too strongly two arms of the system, does it not?

A. Yes. We need, in my view, much closer coupling than there has ever been and the recent decoupling was a move in the wrong direction.

Lord Kearton

80. In my view, having heard the others who are closely connected with universities, the improvements in the way the universities have been run over the last decade have been quite extraordinary and, if I may say so, owe a lot to your guidance, policy, criticism and encouragement. Although you said at the beginning we now have to face real problems, in view of your remarkable achievements in the last ten years and the fact that you will shortly be giving up your office, what advice would you give on the way you would like to see things go over the next five years?

A. I think there needs to be a greater co-ordination between the research council system and the UFC. I myself think a merger of the UFC and PCFC is inevitable, and that the differences in the teaching function between universities and polytechnics are not great enough to justify a permanent split between the two. There is the problem that the research function is radically different, but it is difficult to believe that the dividing line is now where the amount of money available will force it to be in due course. I do not believe we can afford the present 50 institutions all claiming to be deeply committed to research. We cannot afford to fund them all to do research in laboratory subjects.

Lord Gregson

81. Can I follow up the comment which Sir Peter made. There have been a lot of comments over the last two or three years about the question of teaching universities. The discussion goes on and nothing happens in effect. Who really should take the initiative? Is it the Universities Funding Council who ought to look the problem full in the face and decide? Nobody else will, will they?

A. Nobody else will tackle it in detail, but it seems to me it represents a major political decision which the Universities Funding Council simply has not got the status to take unless it knows the Secretary of State will back it.

82. Is it really political or is it a question of judgment on efficiency and on the application problem in effect?

A. No, I think it is political in the sense that the storm of indignation that would be worked up by those universities who were being downgraded would be something which a Secretary of State could not answer simply by saying, "This is the

responsibility of the UFC and I do not interfere with their decisions". In theory he can do that but it is not in practice possible. It would become far easier if the binary line was abolished and the two funding councils merged, because it would then be very difficult to explain why the least distinguished universities had a different nature to the best polytechnics.

Chairman

83. There is a missing middle if we are not very careful. The research councils are responsible for selective research and the UFC is responsible for universities as integral institutions. There can be a fuzzing of the borderline, but the Secretary of State is responsible for the whole lot, is he not?

A. Yes.

84. He cannot say that he does not have responsibility for the health of the universities in total?

A. Yes.

85. I am not trying to get you into difficulties about this, I am only asking almost a constitutional question. Where does that responsibility devolve from the Secretary of State at the present time?

A. The responsibility for the health of the universities devolves primarily on the UFC.

86. You take no account of what is going on in the research councils, you told us, you are not allowed to?

A. We are not allowed to take formal action, but we do in practice in some ways take account. Our research funding methodology, for example, has an increasingly strong emphasis on selectivity. In laboratory subjects there is a very good correlation between high research ranking and a good supply of funds from the research councils. So our money by a somewhat indirect process goes differentially to the same universities, the same departments, that most of the research council money goes to. It is not like that, of course, in the humanities, but the debate on research is almost exclusively about laboratory subjects because that is where the costs are.

87. There is not an ongoing closely interdigitated conversation going on between you and the research councils about the health of the universities as total institutions?

A. No, there is not and I regret that, but a conversation takes two. It is fairer to say both our funding methodology and research councils' funding methodology pushes most of the money into the highly rated departments. So the processes do converge even if there is not conversation between us.

88. You do your best in the circumstances, but the circumstances could be different?

27 February 1991]

SIR PETER SWINNERTON-DYER

[Continued]

[Chairman Contd]

A. Yes.

Lord Gregson

89. There must be very considerable savings to be available if research was concentrated on better universities and less on the universities not very good at research. A great deal of efficiency could be gained by concentrating in teaching in those universities, could it not?

A. There are potentially significant savings, maybe not enormous savings, but you can only achieve them in a period when student numbers are increasing, because if you take a bad university you can say to it, "You will spend more time on teaching; you will teach more students and do less research" providing that more students are there to be recruited. The last couple of years has as it happens been a period of increase in student numbers. The DES projections are that there will be a short flat period until 1995, and growth will start again after 1995. So there are three years in which one can try and sort out more sensible policies.

Lord Dainton

90. Sir Peter, I was slightly alarmed may I say when you slipped into the terminology of universities which are good and bad at research. Universities do not do research, people do research. You may find good people almost anywhere. The danger of being too prescriptive from the top down in the way which has been suggested is that you can quench really very important activities which you later regret. That is not the main point I wish to put to you. We have just had Sir Mark Richmond here, as I think you know, and we were discussing the short-term crisis. It seemed to him that the problem was going to be over studentships which were most easily reducible in number and small grants. As the conversation went on it became clear that this was likely to be a rather permanent problem. I am very worried, and I wonder what your views are on the fact that once one gets into this mode in which it becomes difficult for high quality people to go on to research and from that proceed, as many of them do, into industry, one is in effect having a time bomb on the quality of the work which is ultimately done in productive industry and engineering technology and science because these people have not had the best training possible. Does that strike you as a very difficult problem for the country and it should be a factor in determining the priorities in the future?

A. Yes, I would be exceedingly worried if I thought the cut in the number of research students was a long-term cut. I take the perhaps optimistic view that it is a short-term cut to meet the extremely severe crisis which Sir Mark found when he took office last autumn, and that his intention would be to restore those numbers; that the other expenditures that the SERC has can be cut but cannot be cut as rapidly. I think they will have to be cut even if it means giving up significant areas of science, as I think it probably must.

91. The difficulty, of course, is that when a university system has shown it can cut something and survive as a system, it is very difficult then to ask you to restore that particular cut in the general interests of the country, would you agree?

A. Yes, but the arguments will have to succeed.

Chairman

92. Can I pursue that one a bit. You were present when we were questioning Sir Mark about the flexibility inflexibility ratio (if I might so describe it) and you touched on this just now. Did you feel that the explanations he gave to us were satisfactory from your point of view as the guardian of the universities as total institutions (if I can put it that way)?

A. I think they represent facts and I have to accept them. As I understand it, what he said is what I have just been saying, that in the short run you have to make the cuts in the most flexible budget heads. You can cut the inflexible ones but it takes longer and if the inflexible heads are not those with the higher priority in the medium term, the cuts have to be shifted to them and the flexible high priority ones have to be allowed to recover.

Lord Kearton

93. Should there be a dialogue with the Secretary of State in which an undertaking is given to cut some of the fixed, rigid systems you are locked into in return for funding over the next two or three years for student grants and so forth? Surely that is not beyond the wit of the consultation process, to go to the Secretary of State to fund the X amount of money needed this year with the promise of cuts in future expenditure in some of the present rigidities? You yourself have said you feel you must give up some of the areas of big science, for want of a better word?

A. Yes, and I hope Sir David Phillips has been going to the Secretary of State on that basis, but I have to say that his hand does not seem to me to have been strengthened by the conduct of the SERC in the last year of the previous Chairman.

Chairman

94. Sir Peter, may I ask you one final question. Again from your point of view we, as you know, are focusing our inquiry somewhat on the SERC because that is the biggest Research Council and it seems to have the most problems in the present circumstances, but it is not alone in having problems of a short-term nature. Is it your impression that we were right to concentrate on the SERC or do you think there are other Research Councils which possibly, seen from the point of view of the guardian of the universities, we ought to be thinking about very seriously, too, because even if they are not in difficulty now they might be shortly perhaps?

A. No, I think you are right to concentrate on the SERC. The other Research Council which would appear to be in grave difficulties is the MRC and

27 February 1991]

SIR PETER SWINNERTON-DYER

[Continued]

[Chairman *Contd*]

there will be an unfavourable effect on MRC funded research in universities, but the amount that the medical charities provide in support of research in universities by now exceeds what the MRC provide. It is going up more rapidly, and although it is targeted at those particular diseases that have public appeal, that really does mean that the universities do not have the same problems because of the MRC troubles that they do because of the SERC troubles.

Lord Dainton

95. If I can make a quick comment as President of the Arthritis and Rheumatism Council, which does a very great deal of the research in rheumatology in universities, we are also conscious of another pressure on us which will reduce the effectiveness of our money, which is the reluctance of our Council to pay the overheads which universities would wish to charge and on which we have previously counted as a public good to help the charity work forward. Has Sir Peter any advice to anybody on the matter of overheads which will relieve that problem?

A. Yes. Universities have become very muddled in this area and they have become muddled primarily because of the strangely worded and misguided advice from the DES. I think the right philosophy has to be this. Any university department has a list of research projects which it wants to undertake. For most of those it can obtain from outside some financial support, not necessarily total financial support, and it will have to provide some of the

support itself. What research it actually undertakes must depend on a combination of how badly it wants to do that particular research and what proportion of the costs it can obtain from somebody else. That philosophy has to apply whoever the somebody else is—Research Councils, medical charities, private industry, government departments. If a research project is unattractive the department should demand the full costs plus a bonus for the misdirection of effort. If it is something the department very much wants to do, any outside contribution is helpful even if for example it does not cover the overheads. That is the philosophy that should underlie how much the university is prepared to put in in the way of overheads.

96. So it is really just a financial gain not based on rationale to balance the books?

A. No, it is based on rationale, on how badly you want to do that piece of research. There is an element of poker playing between the head of department and the medical charity or other funding body, but that is nothing new.

Lord Kearton] I must say, I thought Sir Peter's advice was absolutely spot on.

Chairman

97. Sir Peter, you have given us very good value for, not money but time. Can we thank you very much for that and may I repeat that I hope very much you enjoy your well-deserved retirement.

A. Thank you very much.

WEDNESDAY 6 MARCH 1991

Present:

Butterworth, L

Carver, L

Caldecote, V

Dainton, L

Flowers, L (In the Chair)

Kearton, L

Nicol, B

Platt of Writtle, B

Porter of Luddenham, L

SIR DAVID PHILLIPS, Chairman, and MR P J THORPE, Secretary, Advisory Board for the Research Councils, called in and examined.

Chairman

98. Sir David, thank you for joining us and Mr Thorpe also, who is here to put your figures right I understand.¹ As you know we are treating the present financial situation of the Research Councils, especially SERC, rightly or wrongly, as a crisis brought about by a combination of possible mismanagement on the part of SERC itself, under-funding on the part of the Government and Treasury rules which seem somewhat inappropriate and irrelevant in the circumstances of today. No doubt all these points will come up during the next hour or so. First, however, may I refer to your much-publicised confidential letter to the Secretary of State in which you submitted your advice on the allocation of what you clearly regarded as disappointing totals for the years 1991-94 pointing out that it would make it difficult to sustain scientific excellence; asserting that the cost of continuing its current programmes and core commitments for 1991-92 would in the case of SERC require an additional £40 million, in the light of which you would argue for at least an additional £11.9 million rising in later years; reiterating your view that further reductions in the SERC budget should be made in the area of big science and ending with a plea that your advice should be published—which it was in part but only thanks to a leak in the *New Scientist*. That is pretty powerful stuff and I think I should tell you that I have a complete copy of your six page letter before me. In the circumstances are there any comments that you would like to make on this unfortunate episode?

(*Sir David Phillips*) Well I am afraid, Chairman, although I would not wish to begin the interview on this note, that I regard that as a confidential letter to the Secretary of State which he has chosen not to publish. That is his prerogative and the reasons for his doing that are something that you will have to ask him about. In the meantime I cannot really confirm anything that you have said so far.

99. I am not taken aback by what you say, Sir David. Well then, if we may start the questioning proper. If I understand the financial position correctly, SERC had a raw increase in cash of 3 per cent this year. When all the prestidigitation has been done on the figures, do you consider that this bears out the Secretary of State's assertions that the underlying value of the science budget has been

maintained in real terms and that it provides the basis for the continued development of the country's science base?

(*Sir David Phillips*) I think I should begin, my Lord Chairman, by saying what the basis for the calculation is. The budget for 1990-91 was £897 million and the planning figures issued last year for 1991-92 were £912 million, an increase of £15 million. Those were the numbers against which the Research Councils had to make their plans for 1991-92. In the eventual settlement that figure of £912 million was increased to something over £920 million, an increase of a little over £8 million. Now that is by no means an increase commensurate with the rate of inflation but there are additional factors which the Secretary of State wished to take into account. First, different arrangements were made for the Research Councils to pay graduate students fees. They had hitherto been paid at the beginning of every academic year and are now to be paid at the beginning of every term, in instalments of one third of the total, of course; and that means that in the first year of the operation of the new system there is a saving of one third on graduate student fees, namely £8 million. That incidentally has an effect on the cash-flow of universities but it is not my business at this moment to wonder how serious that might be. In addition, ABRC in 1990-91 had anticipated that some expenditure in Europe would be attributed to the science budget and had prudently set aside in the flexibility margin a total of rather more than £7 million in case that was levied on the science budget, so to speak. In the event, the Secretary of State in the PES discussions won from the Treasury the amount that was needed to cover the attribution to the science budget, so that that £7 million became available for other expenditure. Set against these, some additional responsibilities were transferred to the science budget. In particular the responsibility for super-computing was transferred, so additional costs will fall on the science budget of some £2 million. If you add all those things together you will arrive at a figure of some £22 million which was available for the ABRC to reallocate to the Research Councils for 1991-92. That is, of course, in addition to the £15 million increase which was already in the planning figures and had already been taken into account in Research Council and ABRC plans. Those two figures together, the £22 million and the £15 million, still do not add up to 6 per cent which is the Government's estimate of inflation for

¹A table and figures handed in by ABRC are printed after Q 154.

6 March 1991]

SIR DAVID PHILLIPS
and MR P J THORPE

[Continued

[Chairman *Contd*]

the year. In order to bring the apparent increase up to the level the Secretary of State, and no doubt the Treasury—

100. May I just interrupt you there as you said the Government's estimate of 6 per cent—it turned out to be 9 point something did it not?

(*Sir David Phillips*) Yes, in 1990-91. The estimate is that it will be 6 per cent in 1991-92, so that is to some extent a hope.

101. I see, right.

(*Sir David Phillips*) The Department and the Treasury draw attention to the fact that in the budget for 1990-91 there were at least two large elements of capital expenditure, £17.3 million to be spent on the construction of the Royal Research ship, JAMES CLARK ROSS, which is intended for support of the British Antarctic Survey; and some research in association with the British Antarctic Survey and some £6 million which is capital expenditure on the new Research Council Headquarters building in Swindon. The argument is that this capital expenditure, which remains in the baseline, is no longer needed for capital purposes in 1991-92 and becomes available for expenditure on general scientific purposes in that year, and that it therefore represents an increase in the science budget. So if you add that sum also to the rest of it, that is a further £24 million, you get up to the total increase in the science budget of rather more than 6 per cent which is, in the Secretary of State's terms, maintaining the value of the science budget in real terms. That is the basis of the Government's argument. My concerns about that are that it will only be true if the Government achieves its objective of reducing inflation to 6 per cent in 1991-92. Even then it will only be true if increases in the costs of doing science are the same as the general inflation rate, which is something that might be argued about. It will certainly not be true if the increases in academic salaries are more than 6 per cent; and we are waiting with some concern to hear what the CVCP and the AUT (with the participation of the Government) agree as the academic salary increases which will be implemented from the 1 April. For every 1 per cent above the provision that the Research Councils, SERC in particular, have made for the salary increase, the settlement will cost all of them an extra £2 million, which will have to come from somewhere.

102. Sir David, could I interrupt you for one moment and question you on this one point, which needs clarification. The Research Councils have to pay salary increases which they play no part in setting. They either have to pay academic salaries which are set, as you say, by the CVCP and the AUT and the Government or they have to pay the salaries of the staff which are settled by the Government more generally, and the Research Councils as such have no say in that discussion, as I understand it?

(*Professor Sir David Phillips*) That I believe to be true.

103. And they are not recompensed automatically for the increases that result from those provisions?

(*Professor Sir David Phillips*) No, not at all.

Lord Dainton

104. Could I add one other point of clarification in a question to Sir David. You referred to the money coming as to £6 million from Swindon and the money from the ROSS ship has been built into the baseline at one time?

(*Professor Sir David Phillips*) Yes.

105. Does that mean that it is, in the sense that I would use "baseline", there for ever from the point of view of marking the base from which inflationary increases would be added on after this year or is it just a temporary one?

(*Professor Sir David Phillips*) No, it is in the baseline.

106. So that represents a real increment for the future upon which percentage increases would be coming?

(*Professor Sir David Phillips*) If percentage increases could be relied upon, yes.

Lord Dainton] That is an important point, I think.

Chairman

107. Yes, very important.

(*Professor Sir David Phillips*) That leads me, though, Chairman, to my second point of concern. The ABRC was well aware in making its allocations in 1990-91 that this money for the JAMES CLARKE ROSS and the Polaris House capital expenditure would become available for general scientific expenditure in the following year and the recommendations that the ABRC made to the Secretary of State for additions to the science programme took that addition into account. So that money had already been committed last year and is now to be counted again in some sense this year. Those recommendations, incidentally, were accepted by the Secretary of State, so that a number of new programmes were launched which depended upon that capital money becoming available for general scientific expenses.

108. The other thing I am not clear about—and I do not want to hog the questioning at all—is that the DES in their evidence to us referred to £6.8 million—I think it is known in the trade as Euro-PES money, that is to say, an allowance made and deducted from the science vote in respect of moneys earned from European Community programmes. Was that £6.8 million, or whatever it was, deducted from the science vote, and if it was, how was that allowance arrived at in discussions between, I presume, DES Treasury, that is to say, did it take into account any scientific advice at all or was it just a purely financial transaction?

6 March 1991]

SIR DAVID PHILLIPS
and MR P J THORPE

[Continued]

[Chairman Contd]

(*Professor Sir David Phillips*) If you do not mind I will ask Mr Thorpe to answer that rather technical question.

Lord Dainton

109. Could you at the same time as part of the same answer comment on what Sir Peter Swinerton-Dyer said, that in a sense the £7 million attribution money was not clawed back by the Treasury this year. Is that so?

(*Mr Thorpe*) There is a distinction to be drawn between what is called Euro-PES and estimates of EC receipts. The £6.8 million which you referred to is, I believe, the figure for estimated EC receipts. The Treasury's accounting practices are that the figures declared in the Public Expenditure White Paper include estimates of receipts by Research Councils from the European Community for research programmes, on top of the amounts included within the UK science budget. So the figures in the Public Expenditure White Paper are the science budget figures that we recognise here of £921 million plus a further £6.8 million, which are the estimate of EC receipts in that year. So the figure quoted in the Public Expenditure White Paper is a total figure of £928 million, but for our purposes and for what the ABRC has to allocate to the Research Councils, that £7 million is to be disregarded.

(*Professor Sir David Phillips*) That is, for example, as I understand it, money which Research Council institutes win from the European Commission for support of research programmes.

110. So that at least is the removal of a disagreeable non-incentive penalty which we thought existed?

(*Mr Thorpe*) A separate issue concerns the Treasury's Euro-PES system, which this Committee has commented on previously. That system requires expectations of what might be won from Europe to be deducted from, that is "attributed to" domestic programmes. That sum is removed before the total figure for the science budget plus EC receipts is set. The figure that Sir David referred to earlier was the ABRC's estimate this time last year that there might be an increase in the attribution and thus a reduction in the total science budget figure of £7.7 million. In the event that that did not come to pass in terms of a reduction in the Government's science budget figure. We understand that the Secretary of State in his negotiations with the Treasury in effect won an extra £7.7 million which balanced that out, but that did not become public in terms of the announced figures for the science budget.

Chairman

111. Could I just return to the point I made, though, about how, in all this discussion about European money and allowances that had to be made for the Euro-PES or attribution or whatever, that allowance was settled between Treasury and

DES, and was there any scientific input into the advice that was given which led to that allowance being made?

(*Professor Sir David Phillips*) The ABRC gave no advice to the Secretary of State about that, Chairman. As I have said, it merely set aside a sum of money as a hedge against the possibility of an attribution payment, which in the event the Secretary of State was able to avoid.

112. But does that mean that the negotiators of the allowance would have received no scientific advice at all on the matter?

(*Professor Sir David Phillips*) I would hesitate to say that within the Civil Service and the Treasury there is no scientific advice. I can only say that such advice did not come from the ABRC or, so far as I know, from the Research Council system.

113. Who know about it best, after all. There could have been advice by the Cabinet Office in principle?

(*Professor Sir David Phillips*) Yes.

Lord Kearton

114. According to a lot of the evidence we have received, there is a perception by the scientific community that the Government is not sympathetic towards scientists. Has that been your perception in dealing with the various departments or do you feel the Government is trying do its best in circumstances over which it has no control?

(*Professor Sir David Phillips*) My Lord Kearton, we have circulated some diagrams which show the way in which the science budget has varied over the last ten years or more in relation to the change in public expenditure and the gross domestic product. Those figures are cash figures so that the slopes of the graphs represent inflation as much as genuine growth, but they do show that up to 1985-86 or thereabouts these three indicators—the science budget, the GDP and public expenditure—ran together really quite well. In the following period—and all of us around this table, I am sure, are aware of the dangers of graphs in which the origins are away off the bottom somewhere—the science budget, thanks to the increases negotiated by, first of all, Secretary of State Baker and then Secretary of State MacGregor, crept up above the average increase in public expenditure and reached the rate of increase of the gross domestic product. Since then the Government's planning figures are that the rate of increase of the science budget should fall, and it is falling again below the expected rate of increase of the GDP. Of course, one might have a discussion on how realistic it is to expect the GDP to be increasing at this point. So, broadly, from that graph we can see that the Government has attempted to keep the science budget in line with growth in GDP and public expenditure, and since 1988 or thereabouts has actually increased the science budget more than public expenditure generally. However, the planning

6 March 1991]

SIR DAVID PHILLIPS
and MR P J THORPE

[Continued

[Lord Kearton *Contd*]

figures for future years—which are what concern us at the moment—require us to plan for a reduction in the volume of science that is carried out.

115. Essentially forcing you to be more selective?

(*Sir David Phillips*) Yes.

116. Is that a good thing?

(*Sir David Phillips*) Well, without saying whether it is good or bad, I tend to believe that it is unavoidable. Having talked in recent weeks to scientific colleagues from the United States, France and Germany, I find that they all face the same sort of problems of inflexibility in their commitments, growing demands for science expenditure, and the difficulty of getting out of inflexible commitments and putting the money where they think it would be better spent. I think we are all in a sense in the same boat.

117. I think in our questions to Sir Peter Swinnerton-Dyer in our previous session this came out and one of the suggestions made was that you should try to, as it were, bargain with the Secretary of State to try to get more money in the short term to retain studentships and post graduate grants and so forth in return for an undertaking to cut back in large expenditures, some of which are undertaken overseas?

(*Sir David Phillips*) My Lord Kearton, the ABRC will be having its meeting this coming weekend to discuss the Research Councils' forward look plans and I will be extremely surprised if we are not looking at long-term commitments of various kinds with a view to reducing them.

118. Of all the cuts the Research Councils have been forced to make, especially the SERC in 1991-92, it is the cuts in the most vulnerable parts of studentships and research fellowships that most concern us.

(*Sir David Phillips*) I agree with you there. It is to a degree a paradox that the SERC would say that their activities of highest priority are supporting studentships and supporting research grants; and yet the way it works out is that, if there are financial difficulties, it is particularly the research grant support that suffers in the short term.

Lord Dainton

119. This is simply because they have a large tranche of fixed expenditure overseas or in other big activities, is it?

(*Sir David Phillips*) Yes.

Lord Porter of Luddenham

120. Could I follow that up. Sir David knows it is of great concern to us, as well as most of the scientific community—is there no administrative way in which that system could be changed whereby this is almost a fall-back tranche for emergencies for

these funds which we agree are probably the most important that the Research Councils provide. Could there not be some system devised by the ABRC or by the government or whatever which separated the research grants and the studentships from the big institutions and from the international organisations which are so variable because the exchange rates could just not be separated off so that there is a reasonably steady funding of the grants?

(*Sir David Phillips*) I think, my Lord Porter, that is precisely one of the issues we shall have to discuss at the weekend. Since you are bound to ask me questions about this in a moment or so, I will to a degree pre-empt that and say that that particularly relates to the transfer of resources from the UFC to the Research Council system. The Research Councils will be under an obligation to deploy those resources, along with resources of their own, in support of research grants in the higher educations system. So there has to be some way found of ring-fencing this research grant support and making sure it is not used as the elastic part of the research budget that can be spent simply as necessity demands. No doubt many of you will have ideas about how that might be done, and I am not wishing to pre-empt discussion at the ABRC at the weekend, but we shall have to try and find an answer. The one thing I will say is that being involved in long-term commitments, and recognising that one is probably over-involved in long-term commitments and needs to get out of them, does require a degree of long-term planning. In my view that has been recognisably the situation for some years and we should already have begun to withdraw from long-term commitments. That, I am afraid, is something which applies particularly to SERC.

Baroness Platt of Writtle

121. As an engineer I am very much in favour of the science budget but my experience is obviously not in universities or research, my experience has been in the Essex County Council, 12 years as Chairman of Education and Chairman of Finance and for five years Chairman of the Equal Opportunities Commission and under successive governments we suffered in exactly the same way that you did. The salaries that we did not negotiate were never allowed for the full amount of the increase. We had certain absolute commitments that we had to carry out, and we also took into account the fact that you have just mentioned, that there were some things which once you have committed yourself in one year, you have to go on committing yourself for a number of years in the future, and then we did in fact ring-fence certain things that we felt were of the highest priority, and then we put other things into different categories of priority. Are you rather inferring in the past that has not happened?

(*Sir David Phillips*) I do not think it has happened to the degree that it probably should have done and will have to happen in the future.

6 March 1991]

SIR DAVID PHILLIPS
and MR P J THORPE

[Continued]

[Baroness Platt of Writtle *Contd*]

122. Could I just ask one more short question. When we are talking in terms of international subscriptions and so on, would it in fact be a better situation in your view if they were paid in pounds rather than being subjected to the exchange rate?

(*Sir David Phillips*) There have been elaborate negotiations following a detailed survey on whether we should remain as members of CERN. Consequently, elaborate arrangements have been set up for making the way in which our CERN subscription is calculated more equitable to the UK, and I think it now is more equitable. But it remains, even so, rather large: around £60 million per year.

Chairman

123. You cannot change unilaterally anyway?

(*Sir David Phillips*) No.

Lord Carver

124. Continuing on this point, if you are getting rid of these, particularly the large international programmes which cause this inflexibility, they were entered into because it was rightly considered at the time and it was impossible for the nation itself to afford these facilities. If you are going to say, "Well, we are going to cut down on these," what you are saying is, "We are going to cut down on that type of science, we are going to give it a lower priority." When you were talking about that you said you found, going round the United States and Germany and France, that they were all in the same boat. If they are all in the same boat, is there general agreement in the scientific community as to the areas in which they should cut down? Does this mean that they agreed that nuclear physics, astronomy and space are things that are getting too high a priority?

(*Professor Sir David Phillips*) I think I would have to distinguish between people in my kind of position acting as scientific advisers to the various governments, who I think are pretty much agreed on the sort of things that could be done, and other members of the scientific community and possibly even politicians, who are pressing for some of these things for their own purposes. As an example, I think I can say that my colleagues in France and in Germany are both concerned about the high level of expenditure on high energy particle physics at CERN. We are all somewhat concerned about the plans that are being made for a further enhancement of the facility at CERN to turn it into a large hadron collider, all of which is going on while the Americans are busy planning and beginning to construct their super-conducting super-collider. That will also be a hadron collider, though working at a rather higher energy. The scientific adviser community (if I can call it that) agrees that such things ought now to be planned on a global basis and the cost shared between all countries that are interested. Some parts of the scientific communities of all these countries retain a rather competitive spirit and hope that Europe can remain ahead of America or that Texas can lead the world in high energy particle physics

and so on. There is a conflict of that sort to be resolved, but the trend, I am sure, is towards planning these things on a global basis if they are to be done at all.

125. What you are really saying is that there should be greater international co-operation in science so that you do not get duplication of expensive facilities.

(*Professor Sir David Phillips*) Yes.

Chairman] Sir David, you have obviously incited us into some sort of rebellion. Everybody on this side wants to ask you questions!

Baroness Nicol

126. During his evidence last week Sir Peter Swinnerton-Dyer remarked that there appeared to be no reason why university scientific salaries and Research Council scientific salaries should not be decoupled. Would you like to comment on that, first, as a financial exercise, and secondly, as a possible effect on incentives to scientists? What would be the human effect, in other words?

(*Professor Sir David Phillips*) In the first place, I can see on reason in principle why it should not be done. In practice, though, I think it might make management—a word which some people think I am too fond of—within universities and university research laboratories a little difficult if one had people doing very similar things on different salaries. Even that is a situation which already exists, in that graduate students supported by the medical research charities are already paid a good deal more than graduate students supported by the Research Councils. So even that can be lived with, but I think it does lead to friction and difficulty. But broadly I think that I am on the side of those who would say that nationwide, uniform salaries are not necessarily something that have to be aimed at.

Viscount Caldecote] Could I ask what proportion of the £900 million-odd budget of the ABRC is in the inflexible area and, secondly, having had the grant made by the Government to the ABRC, is the ABRC entirely free to cut down the inflexible part in whatever way you think is right, or how much, if any, political pressure is there in that field to maintain or to reduce it for political reasons of co-operation with our European partners?

Chairman

127. By "flexible" we have come to mean that it is responsive mode funding, and "inflexible" is that which is planned beforehand and committed in some way.

(*Professor Sir David Phillips*) I think that is rather a narrow definition. I would rather say what activities may Research Councils get out of at rather short notice. If you look at the third diagram in the set I provided for you, I would say almost all of international subscriptions, that is 11.7 per cent of the total budget; a large percentage of the institutes'

6 March 1991]

SIR DAVID PHILLIPS
and Mr P J THORPE

[Continued]

[Chairman *Contd*]

budget, 22 per cent; superannuation, 3.2 per cent; and a certain proportion of units in higher education, 9 per cent—all of that is somewhat inflexible, even very inflexible. As to how free the Research Councils are to withdraw from these elements of inflexible activity, I could remind you that over the period 1983 to 1985 the ABRC and the SERC, helped by a report from a committee chaired by Sir John Kendrew, looked very seriously at the desirability of the UK withdrawing from CERN; and we came within a year of giving notice that we would withdraw from CERN. The decision that we should not was at least in part a political decision.

Lord Kearton] If I may say so, it was a wrong decision.

Lord Butterworth

128. We seem to have remembered quite a lot of what Sir Peter Swinnerton-Dyer said to us last week. One of the things that I remember is that he said that the present crisis was not a short-term phenomenon but a recognition of a longer-term shortfall of funds, and from this he seemed to draw the consequence that it may well be necessary for us to give up significant areas of science. Those were his words, “give up significant areas of science”. I wonder if you would like to tell us how adept you think the Research Councils are at the management of priorities, and especially the SERC?

(*Professor Sir David Phillips*) Perhaps, my Lord Butterworth, I should start by putting on the record what the ABRC considers the responsibilities of the Research Councils to be and what arguments they are entitled to put forward for additional resources. In the first place, they must plan to live within the planning figures that they are provided with by Government; and furthermore, in living within those figures, they should plan to support those activities which they regard as being of highest priority within their field of responsibility. If then they come to the ABRC and through the ABRC to Government asking for additional resources, they have to say: “We would like to engage in this activity but it is, by definition, of lower priority than all the other things we are doing—because necessarily we are supporting all those things which we regard as being of the highest priority.”

129. When, in order to advance their case, they say—and I am inventing figures—“We have 173 projects, all of which are alpha rated,” that kind of sentence does not imply a great awareness of the ordering of priorities to me.

(*Professor Sir David Phillips*) I am not myself a great supporter of the argument about alpha rated projects, and it is in any case a somewhat narrow part of the argument about a total Research Council portfolio.

130. Indeed, I accept that.

(*Professor Sir David Phillips*) The councils clearly regard, and should regard, the support of research grants to research workers in higher education as

one of the high priority elements of their research portfolio and they should, therefore, plan to support those.

Chairman

131. I wonder whether I can continue with that a little bit. Were the growing difficulties of SERC reported to you last year, as I believe they should have been, and could you tell us what you did about it? In particular, do you agree with Sir Peter Swinnerton-Dyer when he said in his evidence to us last week that your hand with the Secretary of State does not seem to have been strengthened by the conduct of the SERC in the last year of the previous Chairman? Was there an element of over-optimism, even of miscalculation or recklessness?

(*Sir David Phillips*) I think that I would have to say that, to begin with, the planning figures that SERC had to work on between the years 1990-91 and 1991-92 showed a very small increase in cash terms; that is to say, they showed a reduction in real terms; which is something the SERC found extremely difficult to come to terms with. It was confronted with the problem that it had somehow to reduce the volume of its expenditure.

132. Did it come as a complete shock to them?

(*Sir David Phillips*) It could not have done that. They had at least a year's notice that that was the situation.

133. Does that mean that they forged ahead nevertheless?

(*Sir David Phillips*) The former Chairman of SERC in a recent article in *New Scientist* has pointed out in effect that the Chairman of a council like his has two alternative approaches. He can either plan to live within the planning figures, which is what the ABRC requires of them, and that will have the effect of depressing morale in the scientific community; or he can take a calculated risk that the government at the end of the financial year, as a result of the PES discussions, will indeed provide additional resources to pay for the additional science that they have planned to do. The former Chairman of SERC chose to take an optimistic view of what the government's PES outcome was likely to be. It reminds me a little of the porter in *Macbeth*, whom you might remember took his job of answering the door in a rather leisurely manner and in the meantime speculated about who it might be. One of the people he thought might be knocking at the door was “a farmer who had hanged himself on the expectation of plenty”. To some extent I am afraid the SERC can be said to have done that last year.

134. Whatever the faults may have been, the consequences of the crisis in SERC especially is having implications for the universities or at least a lot of people are extremely disturbed about it—whether it has really hit them yet or not we shall find out from our next witnesses but what I wanted to ask was in these circumstances it seems to me proper that

6 March 1991]

SIR DAVID PHILLIPS
and MR P J THORPE

[Continued]

[Chairman Contd]

there should have been discussions between the UFC and ABRC about the management of the crisis. Were there such discussions?

(*Sir David Phillips*) If I could answer that question and then go back to the earlier question about ABRC. Discussions between the Research Council system and the ABRC and the UFC have not been at an active and fruitful level since the foundation of the UFC. That partly arises, I believe, from the fact that the UFC takes the view that its job is to provide the resources for the universities, and it is then the universities' job to manage those resources to do the jobs that they are supposed to do, including both teaching and research; but it is not the UFC's job to manage the universities. If the Research Councils need to interact with the universities as the agents which carry out research on behalf of the Research Councils, then the Research Councils would do better to be talking to the universities than talking to the UFC. That seems to be the philosophy.

135. Does that mean that the UFC refuses to accept any responsibility for the overall health of the universities? Is it just regarding itself as an outfit which dishes out the budget on some formula it has and then goes home and sleeps until the next year?

(*Sir David Phillips*) I think that is a question that you would do well to put to one of your colleagues.

Lord Dainton

136. Can I come back to the point that Sir David Phillips mentioned earlier about the desirability to protect some of the smaller activities in science and studentships and so forth and you referred at that point, I think, to the transfer money. Were you referring to the proposed £150 million transfer from the UFC to the science vote?

(*Sir David Phillips*) I am with you as far as £100 million—I did not know about £150 million. £100 million is the estimate for the full year, and £50 million for the first half year, but those figures are not yet finally decided.

137. Thank you very much. May I just pursue this a little bit because I think you also went on to say that this might be used by the Research Councils, presumably with the blessing of the ABRC, to protect the studentships. Did I hear that correctly?

(*Sir David Phillips*) Not studentships, but research grants; and I did not say it would be used to protect the research grants. At least I did not intend to, my Lord Dainton. My view is that when the Research Councils accept this transfer of funds, it will be related to the extent of their grant support to universities. They will be under obligation to maintain that grant support in universities and not to use that money for other purposes.

138. It is simply for the indirect costs or a proportion of them excluding academic salaries and premises, it is purely to support indirect costs?

(*Sir David Phillips*) Some direct costs as well as indirect costs.

139. But it can have no effect on the capacity of the Research Councils to provide more research students or post graduate fellowships?

(*Sir David Phillips*) It most certainly should not, and the Secretary of State has said he will watch the situation very carefully.

140. In effect the transfer of funds has no effect on that particular issue?

(*Sir David Phillips*) No, it should have a totally neutral effect.

141. A neutral effect on the system as a whole although it will be discriminatory between universities depending on the research grants they have depending on the decisions of the Research Councils?

(*Sir David Phillips*) Those universities that are most active in research will appear to lose the most from their UFC budget as a result of this transfer but they should get this money back from the Research Councils.

142. It will be made individual in respect of each university in respect of the system as a whole from what you have said?

(*Sir David Phillips*) Well, the extent to which individual universities receive grants from the Research Councils is by no means uniform. Some universities get rather little grant support, and in consequence a rather small proportion of their UFC grant will be transferred to the Research Councils.

143. I am still puzzled if I may pursue this, Chairman. I understood the transfer was from the University Funding Council to the ABRC vote and not to individual universities. Are you telling us the UFC will be taking account of this when it makes its allocations to the universities?

(*Sir David Phillips*) Yes.

Lord Dainton] That is not what I think we understood.

Chairman] We do now. Thank you, Sir David. We must press on because we must let you go and let our other witnesses in. Are there any further questions?

Lord Kearton

144. Would you welcome the chief executive of the UFC re-joining the ABRC?

(*Sir David Phillips*) Yes, Graeme Davies is a friend of mine and I think the answer to that is yes.

145. Apart from personal grounds, on policy grounds too you would welcome it?

(*Sir David Phillips*) That is not where I think the problem is if I have correctly summarised the philosophy of UFC, and that is going to be maintained. I think it drives the Research Councils to improve their direct relationships with higher education.

6 March 1991]

SIR DAVID PHILLIPS
and MR P J THORPE

[Continued

[Lord Kearton Contd]

146. The two are not exclusive are they?

(Sir David Phillips) No, but it is not that easy to see precisely what role of discussion between the Research Councils and UFC is.

Chairman

147. May I put it in slightly constitutional terms, as I did to Sir Peter last week. The Secretary of State is responsible for research and responsible for the universities as total institutions. Where does the responsibility for universities in total devolve. The answer Sir Peter gave was that it does not, which suggests to me either there have to be discussions between the research side of the house and UFC side of the house or else there has to be some sort of over-riding body that advises the Secretary of State about the overall health and it follows to my mind that there have to be good working relationships between the UFC and ABRC in order to fulfil one of the Secretary of State's responsibilities.

(Professor Sir David Phillips) I should at least say that over the last year I and Mr Thorpe have had regular meetings with Sir Peter Swinnerton-Dyer and his Secretariat and that has maintained some sort of bridge between the two systems. But it is a very informal bridge and I still am somewhat puzzled about what kind of policy decision the ABRC and UFC might come to together, given what I understand to be the philosophy of the UFC.

148. Of the Chairman of the UFC?

(Professor Sir David Phillips) Yes. Having said that, there is, of course, much discussion at the moment about some form of unification of the UFC and the PCFC, which would be bound to have important consequences in terms of the funding of research in higher education institutions. One of the models which people talk about in that context is that the UFC and the PCFC should give up the funding of research and all research funding should be delegated to some other body. That is a model which I think deserves consideration.

Lord Porter of Luddenham

149. It is quite fashionable these days, and has been for many days, to pooh-pooh the idea of unfunded alpha rated grants, and Sir David has added his "pooh-ness" to it today! He also said in the next breath that it is, of course, the duty of the Research Councils to fund research in the universities. The alpha rating is an outcome of peer review. What alternative judgment does he see the Research Councils giving if it is not peer review and classification into alphas, betas and gammas, having said that it is their duty to support research in the universities?

(Professor Sir David Phillips) I will, first of all, say, Lord Porter, that it is some time since Research Councils rated anything gamma. They tend rather to rate grants alpha 1, alpha 2, alpha 3, alpha 4 and alpha 5.

150. And betas?

(Professor Sir David Phillips) And beta, occasionally beta. There are, admittedly, some which are discarded as being unworthy. Having said that, there are, I believe, other complications which, as you know, we have discussed before. Some people of eminence in science choose to support their research work simply through the project grant mode of support and such people often have up to ten individual research grants, no doubt rated alpha and funded. Some people—and these are the people I believe you are most concerned about—are individual young scientists who put in one grant application and it is rated alpha and not funded. That I believe to be a rather small proportion of the unfunded alphas. It is extremely common for scientists to submit four or six grant applications in the confidence that some of them will be funded. It is, indeed, a very complicated situation which scientists play as best they can in a period of admittedly low funding.

Chairman

151. Grantsmanship still lives!

(Professor Sir David Phillips) I think to say that all the unfunded alphas should be funded is a gross over-simplification of a very complicated problem.

Lord Porter of Luddenham

152. Some measure has to be taken. What about using it on a relative basis? This year the funding has dropped to half in number of what it was the previous year by the Science Board of the SERC. Would Sir David not worry about that? Whether they are alpha 1s, 2s, 3s or 4s they could all have been approved by the peer review system as at least worthy of looking at?

(Professor Sir David Phillips) My Lord Chairman, I did begin, I think, earlier on by saying that in my view some way needs to be found of ring-fencing the support for the appropriate number of research grants to be issued to universities. This year, confronted by a financial crisis, SERC has had no other alternative but to cut the number of research grants that it awards and I think that a most unfortunate and distressing situation which we ought to do our very best to avoid in the future.

Chairman] Lord Dainton is going to ask our last question.

Lord Dainton

153. Sir David, coming back to the question of transferred funds, I think it was whether the system as a whole is financially neutral and as the discussion went on it seemed to be neutral as far as individual universities were concerned. I am then left in my mind asking the question, if it is neutral, if it has no effect, what is the positive reason for doing it?

(Professor Sir David Phillips) I think there are a number of issues. The idea was first put forward in the ABRC's strategy document of 1987. One of the arguments there was that it is rather unsatisfactory

6 March 1991]

SIR DAVID PHILLIPS
and MR P J THORPE

[Continued

[Lord Dainton Contd]

in general to have research supported by more than one agency, because each individual agency does not know how much it can count on the other agency providing towards the research. There are many eminent scientists who have made public statements that the Research Councils, for example, have awarded them post-doctoral assistants for three years and recurrent expenses which are only enough for one year. The underlying reason for that is that in the Research Councils' minds all the recurrent expenses for the other two years should have been provided by the higher education institution. That was part of their responsibilities under the dual support system. This transfer of funds is intended to remove that difficulty. Research Council grant committees will no longer sit around and argue, "We must leave such-and-such headings of expenditure for the universities to provide." They will know that they are the funders of that research and responsible for seeing that it is funded properly. But I think there are also potentially, and I hope realistically, benefits to be gained by the universities. One of the problems that the universities have faced is that other government departments—industry, and I will say in the margins research charities, though I think I would want to discuss them separately if you wanted to go into that—have tended to follow the lead of Research Council funding and to have provided grants to universities on a marginal basis. Now universities are perfectly entitled managerially to accept such grants but they have to realise that if they are subsidising them from their UFC grant and they accept too many such grants, in the end they will go bankrupt. If the Research Councils are now to provide the full direct and indirect costs of the research, apart from the staff costs and premises expenses, then it is to be hoped that other government departments and industry will at least follow that model. I would go further than that and

say that I hope universities will recognise that if they seek research grants from such bodies as other government departments and industry, they should consider whether they should not get the full costs, including staff costs and premises expenses, from those agencies. If all that were followed, the universities at the end would be much better off than they are at the moment.

154. Except that they would have very limited free moneys of their own to support the researcher who is young and not yet in a state of—

(*Professor Sir David Phillips*) I do not accept that. Universities have always had an obligation to support the research grants which Research Councils award them. They have had an obligation to provide some consumables, some apparatus and some technical support and so on. The money that is being transferred is the money that was supposed to be used for those purposes. It will have a neutral effect. If, in addition to that, they no longer use their UFC research money to subsidise grants from other government departments and industry, they will, in fact, have more money to use for their own purposes.

If that second condition is applied it is true but unfortunately the universities over the last few years have suffered a decline in their real resources and I think it is that together with other factors that produces the gearing effect on their ability to support young scientists.

(*Sir David Phillips*) I think it is a question of management in universities which again is a question I am well-known for having a view on. It is a question of how well universities manage their resources.

Chairman] I think there we must leave it, Sir David. You have been very helpful indeed. Thank you for coming and thank you, Mr Thorpe, also.

6 March 1991]

[Continued

*Advisory Board for the Research Councils
Recent Trends in UK Expenditure*

Year	Public Expenditure		GDP		Science Budget	
	Cash (£Bn)	Index	Cash (£Bn)	Index	Cash (£m)	Index
1979-80	89.9	100.0	204.9	100.0	329.4	100.0
1980-81	108.6	120.8	233.5	114.0	395.0	119.9
1981-82	120.5	134.0	256.2	125.1	439.4	133.4
1982-83	132.6	147.5	280.5	136.9	468.7	142.3
1983-84	140.4	156.2	304.2	148.5	503.2	152.8
1984-85	150.6	167.5	325.9	159.1	535.4	162.5
1985-86	158.2	176.0	356.5	174.0	571.0	173.4
1986-87	164.4	182.9	383.8	187.3	602.4	182.9
1987-88	172.8	192.2	425.1	207.5	658.2	199.8
1988-89	179.3	199.4	474.2	231.4	708.7	215.2
1989-90	198.9	221.2	514.1	250.9	815.5	247.6
1990-91	217.0	241.4	558.0	272.3	897.0	272.3
1991-92	233.7	260.0	604.0	294.8	920.8	279.6
1992-93	251.1	279.3	649.0	316.8	973.7	295.6
1993-94	263.9	293.5	690.0	336.8	1,006.9	305.7

6 March 1991]

[Continued

Fig. 1: Relative Growth of GDP, Public Expenditure and the Science Budget

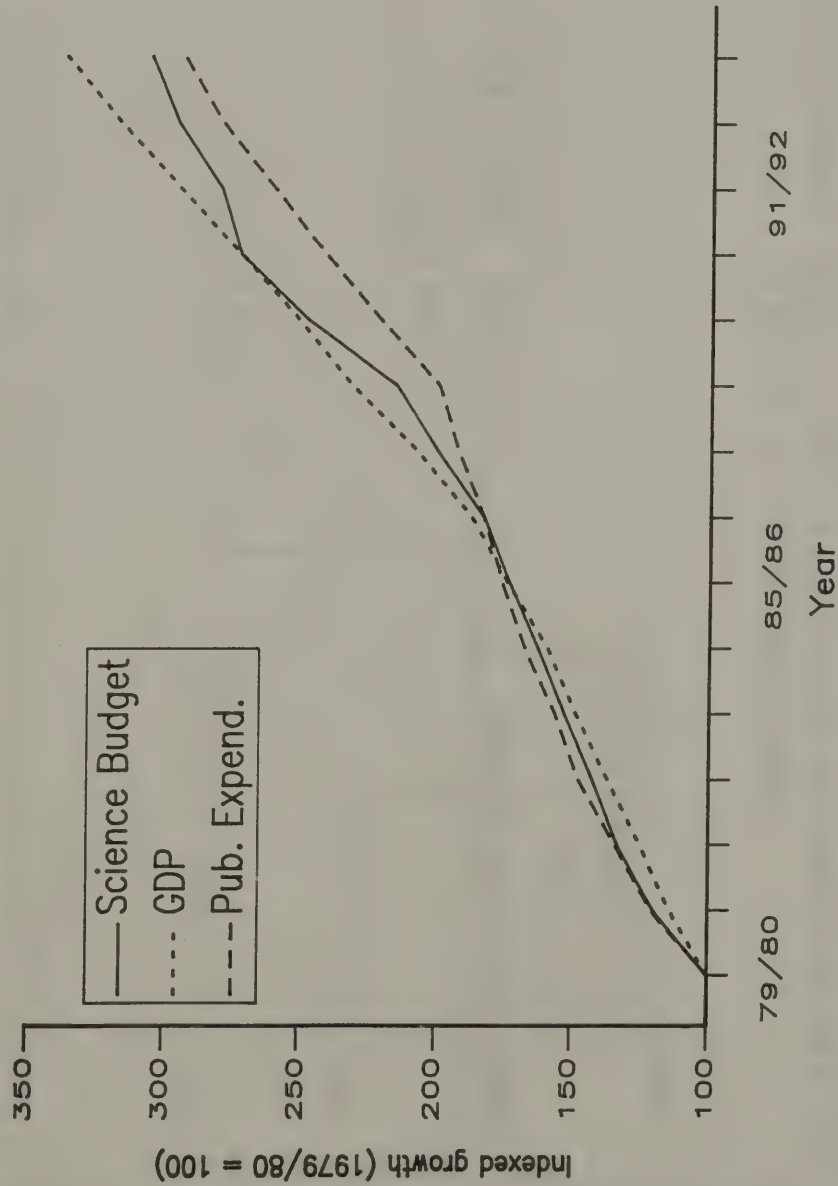
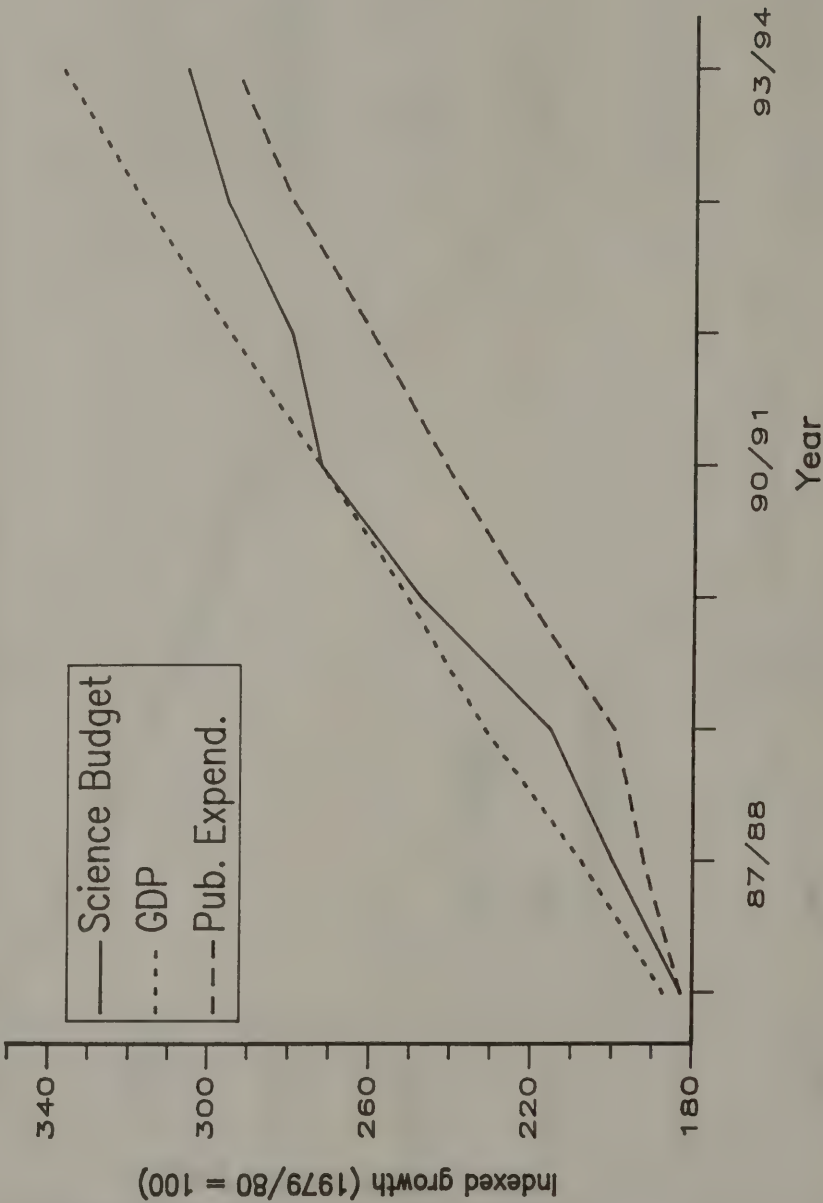


Fig. 2: Relative Growth of GDP, Public Expenditure and the Science Budget



6 March 1991]

[Continued

Fig. 3: Science Budget (1991-92)

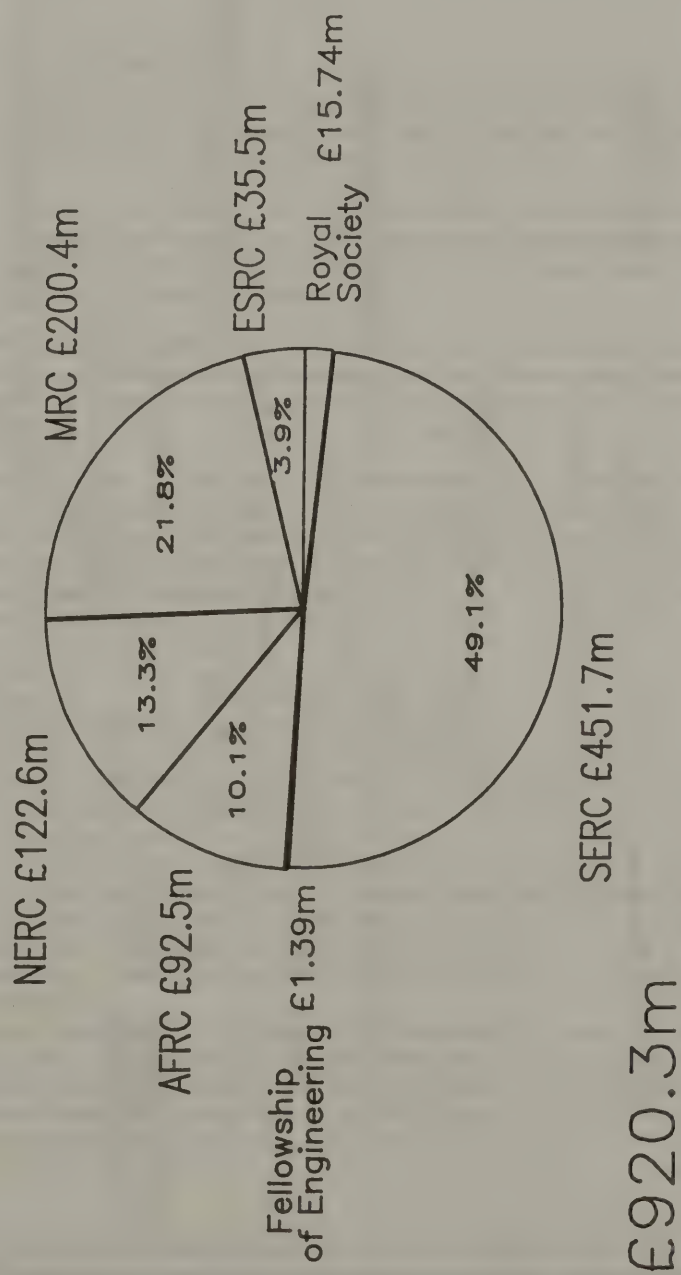
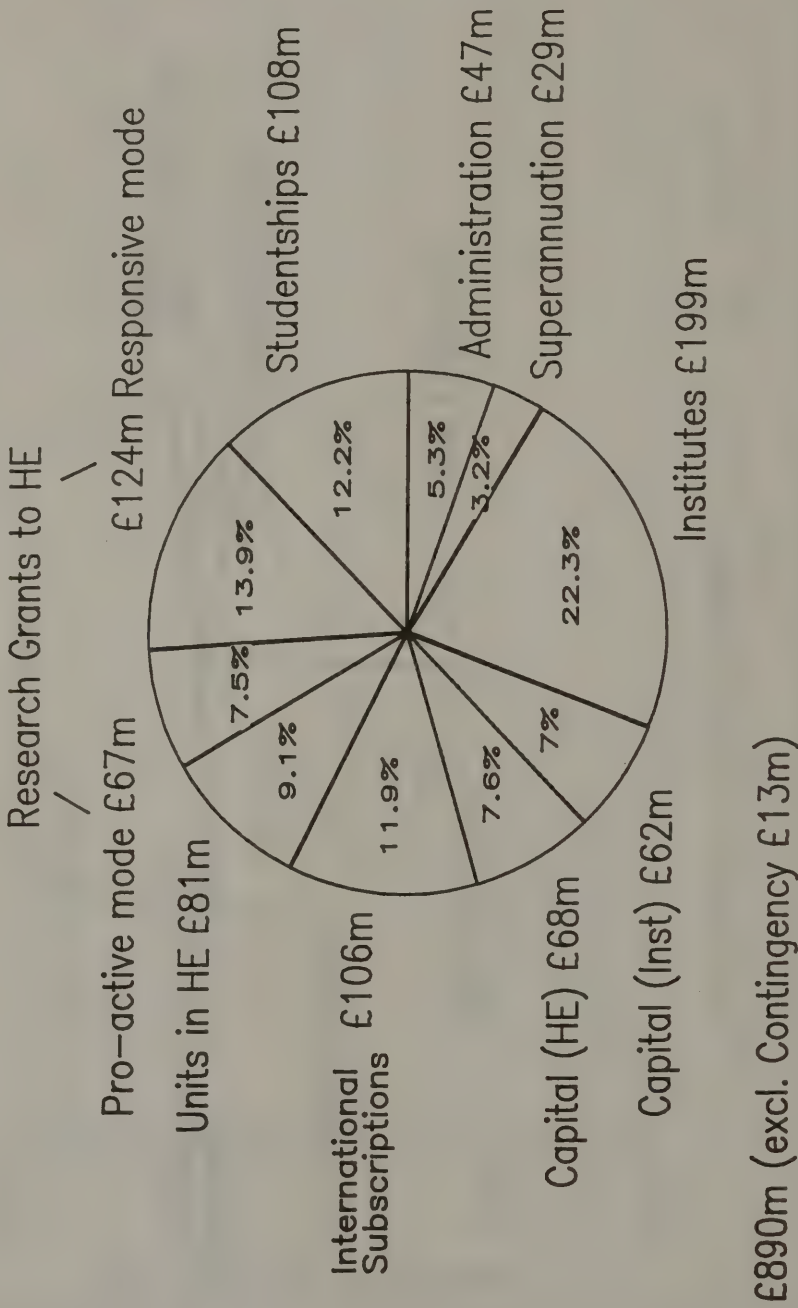


Fig. 4: Research Council Allocations (1991—92)

by mode of spend



*6 March 1991]**[Continued]***Memorandum by the Committee of Vice-Chancellors and Principals****RESEARCH FUNCTIONS OF UNIVERSITIES**

1. The major research functions of the universities are:
 - (a) The training of the next generation of researchers for employment in all sectors of the economy.
 - (b) Initiating and undertaking most of the nation's long-term basic and strategic research, which provide the basis for future applied research and industrial development.

These functions are inter-related. Training of researchers (i.e., postgraduate education leading to higher research-based degrees) requires well equipped research laboratories and academic staff who are engaged in leading-edge research activity.

INTERNATIONAL COMPARISONS AND COSTS OF RESEARCH

2. International comparisons show that UK Government spending on the science base has not kept pace with that of other major industrial nations. The Government's measures of inflation are inappropriate indicators of increases in the costs of research. Science base funding should be linked to GDP growth.

3. The increase of 3 per cent in the Science Budget for 1991-92 compares with inflation (as measured by the RPI) of 9.3 per cent. The costs of research have been affected particularly by the increasing sophistication of equipment, the rapid growth in costs of scientific journals and publication costs, escalation in the price of consumables, and repeated underfunding of salary settlements.

4. Key problems for universities have been the uncertainty from year to year in provision for the science base, insufficient provision for equipment (despite earmarked additional grants in recent years), and erosion of flexibility for universities to manage their research activity. The overriding difficulty is the inadequacy of the total sum of money for university research.

5. Other countries are increasing substantially their investment in research and postgraduate training. The USA has announced its intention to double the Federal Government funding of R&D over the coming years. Within these plans investment in manpower and research training are crucial factors. The UK cannot afford to neglect them if it wishes to maintain an international position. We endorse the recommendations in reports of other Parliamentary enquiries on the relationship between UK science policy and EC research and development programmes.

UNIVERSITY COMMENTS

6. Universities in their comments to the CVCP on the Science Budget have drawn attention to the following:

- (a) The vital role of international collaboration, especially within Europe; collaboration cannot be sustained if the infrastructure which supports UK research falls behind those with whom we collaborate.
- (b) The importance of opportunities for new young academic staff to initiate research; consideration should be given to the introduction of a basic measure of institutional funding for this purpose.
- (c) The need for postgraduate training and responsive-mode funding of projects to be given priority by the Research Councils in reviewing their future plans.
- (d) Emphasis must continue to be placed on quality of research proposals in determining the allocation of research funding.
- (e) The major research facilities managed by the Research Councils should be reviewed periodically; there is a strong case for those facilities which are provided primarily for the university research community to be managed by consortia of the major university users.
- (f) International subscriptions to which the Councils are committed as a result of inter-governmental agreements should be funded from a separately funded budget.

DUAL SUPPORT SYSTEM CHANGES

7. Many universities have expressed serious concerns that the proposed changes to the dual support system will damage both teaching and research. There is doubt whether there will be significant advantages to the universities from a transfer of money from the UFC to the Research Councils. It is feared that the changes will result in a reduction in the volume of research. It is already clear from studies of research costs led jointly by the CVCP and the Research Councils that there is underfunding on both sides of the dual system and that more is being spent by universities in support of Research Council projects than the value of the DR component of the UFC's resource allocation. If more is transferred to the Research Councils than DR, the universities will have less to spend on teaching and on other research activity.

8. The Councils have indicated that they intend to increase the concentration of research funding. This may lead to the emergence of essentially research-based and teaching-based universities. The implications

6 March 1991]

[Continued

for the training of research manpower are serious, because first class research training cannot be sustained in institutions which do not have the necessary infrastructure and equipment, and in which academic staff are not engaged in high level research projects.

9. The changes will lead to a loss of flexibility in the management of research. In particular the ability of universities to support innovative research and younger researchers may be severely impaired. It is inefficient to manage the provision of research support services for much long-term basic research on a project by project basis. Many projects are complementary and increasing cross departmental boundaries. Management of workshop facilities and other services at the point of delivery will be put at risk if most research funding is in future to be tied to individual projects.

EMPLOYMENT OF RESEARCH STAFF: POSSIBLE CHANGES IN RESEARCH GRANT CONDITIONS

10. We are concerned that the possible introduction of cash-limited research grants by the Research Councils could lead to the worsening of conditions of employment for research staff on fixed term contracts. This group of staff now numbers about 17,000 (including those supported by other research funding agencies). Measures that reduce the flexibility which universities have to manage the employment of this important group of staff efficiently must be avoided.

Examination of Witnesses

DR C L BRUNDIN, Vice-Chancellor, University of Warwick, DR K J R EDWARDS, Vice-Chancellor, University of Leicester, MR S A MOORE, Deputy Vice-Chancellor, University of Manchester and PROFESSOR SIR ERIC ASH, Rector, Imperial College, called in and examined.

Chairman

155. Dr Brundin, thank you and your colleagues for joining us this morning. As you know we are trying to investigate the causes of an apparent crisis this year in the funding of the Research Councils, SERC in particular. We are not on this occasion concerning ourselves with the place of research in universities in general. We take that for granted and, as a matter of fact, we think we know quite a lot about it already. However, Sir Peter Swinnerton-Dyer suggested to us when we saw him last week that it was not so much a crisis as a sudden recognition of a long-term trend which had been treated for too long by short-term expedients. I would like to ask you whether you agree with that and also I would like to ask you whether you and your colleagues have anything else to say by way of introduction?

(Dr Brundin) Thank you very much. I would agree, I think, with that statement with the exception of the word "sudden" because I think some of us have believed that we have recognised for quite a long time that the problem was precisely as Sir Peter has expressed it. The sudden recognition is perhaps outside the university system itself although I think we have been aware of the difficulties for quite some considerable time. I note that you are not interested in the general question of the place of research within universities but the problem about funding from the point of view of universities, I think, can be looked at in three categories: the general level of funding, on which I think there is now an acceptance that the steady decline with the sort of short-term expedient measures which have been put in from time to time has led to a situation which is now clearly very serious. There are problems, of course also about the distribution of that funding and I have no doubt that that is one of the things that you will wish to question us about this morning. So unless you want me to, I will not go into any detail

on that at this particular moment. The third point which is, of course, an extremely important point and again one that is becoming, more difficult as time goes on is the absence of—I do not even say adequate provision any more—but the absence of provision for capital expenditure and I would include with that not only the replacement of equipment but also the updating of buildings, sometimes even the construction of new buildings. It is even occasionally necessary to replace a building which has outlived its useful life and the funding of that aspect of the operation is now becoming extremely difficult and in many cases appears to be impossible. I do not know whether my colleagues want to add anything to my introductory remarks.

156. Could I press you slightly on the last point you made because we have taken that with Sir Peter and also with Sir David this morning, namely that there seems to be singularly little constructive discussion between the ABRC and the Research Councils on the one hand and the UFC on the other about the totality of university activity so that, for example, when a piece of building or piece of equipment needs replacement the Research Councils tend to say, "That is the responsibility of the UFC," and the UFC says, "No, that is the responsibility of the Research Councils," and nothing happens.

(Dr Brundin) That is a correct statement.

(Professor Sir Eric Ash) It extends also to computer facilities which are unfortunately split in their responsibility between the UFC and the ABRC.

157. To what extent does all of that contribute to the apparent crisis we have on our hands at the moment?

(Dr Brundin) I think the failure to address the problem of capital funding is certainly a major contributory element because one talks about a

6 March 1991]

DR C L BRUNDIN, DR K J R EDWARDS,
MR S A MOORE and PROFESSOR SIR ERIC ASH

[Continued]

[Chairman *Contd*]

crisis, a crisis is I suppose simply the point at which you realise you are moving up or down a steepening slope, depending on how you want to look at it, and you suddenly realise that the slope is becoming so steep that you cannot climb any more or your brakes do not work to stop you sliding on down. I do not think there has been a sudden change. There has been simply, if you look back over 20 or 30 years, a complete shift in the funding methods and one result of that shift is that capital funding has disappeared completely.

Baroness Nicol

158. Can I put in a question at this point. It has been suggested to us that part of the difficulty for universities, and a large part of it, is that their financial management is not up to scratch. Would you like to comment on what happens on financial management whether the universities have recently modernised as a whole, or whether you feel there is any foundation in this remark?

(*Dr Brundin*) I can only speak for my own university and I shall leave my colleagues to speak for themselves. I inherited an institution which was extremely well-managed financially. I think I would say we have not found it necessary to make any major changes in our financial management because it has always been good and therefore as far as my own university is concerned I do not accept that it is badly managed, either financially or in any other respect.

(*Mr Moore*) Could I add a comment relating to the University of Manchester. We have a turnover of over £100 million a year. We manage that turnover, we believe, in the full knowledge of all our expenditure and costs and we have been operating on the basis of yearly break-even—we are a charitable institution. We find it very difficult to make provision for long-term capital expenditure. Before I came to this meeting I asked our Director of Estates if he could give us a rough idea of the major capital expenditure we would need to make in the scientific area in the near future. For health and safety reasons and for scientific reasons, he told me we would need to spend £4 million just renovating fume cupboards in the science departments alone. We will need to spend £2 million in removal of animal facilities and general refurbishment, which also includes some health and safety work, will be of the order of £7 million. These are substantial sums of money for a university which I believe is well-managed financially and knows what it is doing, but it will be very difficult for us to find those large sums of money for these kinds of capital developments.

Chairman

159. But the complaint is that there is not at the present time capital money to cover things of that sort, which, after all, are perfectly normal repair and maintenance items?

(*Dr Brundin*) That is right.

(*Dr Edwards*) If I may say so, I think there has been a change in UFC policy as well. The letter inviting us a year ago to make bids in the planning policy up to 1994-95 specifically said we should, in our place, assume we were going to have to finance capital developments out of current income and that is a considerable change of policy. So we are having to adapt to a change of policy in the short term.

160. It sounds as though you were wrong.

(*Dr Edwards*) That could be.

Lord Dainton

161. In the old days one took year-by-year the notion of capital, including management accounts, as a separate item and that was your base for calculating how you were varying your financial fortunes over time and now it is just your current income as against your current plus capital because the capital has disappeared, if I understand it alright?

(*Dr Edwards*) That is right.

162. So that you had a step function cut hidden away in the formula funding?

(*Dr Brundin*) That is right.

(*Professor Sir Eric Ash*) Can I add again to what Dr Brundin has said. I too inherited a university that was financially extremely well-managed. We have been looking at even further improvements in the last few years and I think the most important one is that we are now very much more aware of our costs. We are continuing our researches into deciding where the costs actually fall and I believe we are, therefore, in a very much better position to be able to discuss with government departments and with industry what a piece of research costs. I believe that the general management of our finances is totally professional and I think it would bear comparison with that of any well-run company. I also believe that is widely true of the university system—perhaps not universally but widely true.

(*Dr Brundin*) Could I answer what might be a criticism of the fact that we are unable to finance these things out of our current income because you could say that is simply evidence of the fact that you are trying to do too much, that you ought to cut down the volume of your activities until it matches what you can actually afford, but, of course, our income is volume-related and if we reduce the volume of our activities we reduce the income proportionately and the problems remain exactly the same as they were before.

Viscount Caldecote

163. Very many years ago I was involved a bit in the capital programme of Cambridge University Engineering Department. In those days we used to have what were called earmarked grants and the university made an application to the University Grants Committee and had to make a good case and prepare its plan and then you either did or did not

6 March 1991]

DR C L BRUNDIN, DR K J R EDWARDS,
MR S A MOORE and PROFESSOR SIR ERIC ASH

[Continued

[Viscount Caldecote *Contd*]

get your money. You got it if you had good plans and that seemed to work extremely well. Would you like to see a return to this sort of system where there were earmarked grants specifically for capital programmes?

(*Dr Brundin*) I think we would welcome a return to any sort of system which provided access to the sort of funds. In so far as earmarked grants still exist they only exist when we are responding to an external initiative and are invited to bid to participate in some new programme which has been introduced. There is no opportunity to bid for an earmarked grant on the basis of our initiative rather than one which has come from outside.

Lord Dainton] There is no responsive mode venture capital funding.

Chairman

164. May I put to you a point which has been put to us in some of the evidence we have had. Is it the case that a diminishing proportion of UFC funds find their way into research, given the admitted pressures on university coffers generally? The UFC gives you a certain amount of money that is supposed to be for research. How much of it actually goes into research? I am talking about the average university.

(*Dr Brundin*) To answer that for the average university is probably fairly difficult but my feeling would be, based on the experience of my own university, that the amount of money which the UFC gives us which is identified for research has actually declined more rapidly than our own expenditure on research. The cross-subsidies have actually been in the opposite direction. Just to take a number as an example, the principal targeted element of research funding is the so-called DR element in the grant, which was allegedly 40 per cent; in the current year it is 29 per cent. The costs of what we are doing have not gone down; the volume of what we are doing has actually gone up. Therefore, I would say that in the average university the flow has been in exactly the opposite direction, that we are subsidising research out of other sources of income.

165. But the charge is that the research element of the UFC budget is given to you and you can do what you like with it because it is not separately accounted for?

(*Dr Brundin*) That is right, but what I am saying to you is that I believe that we put more into research than flows in through that channel, not that we have moved money from that channel to keep our other activities going but rather that we are cross-subsidising in the opposite direction.

Lord Dainton

166. Sir David Phillips, who was here before, was making the point apropos the transfer of funds from the UFC vote to the science vote that, in fact, universities were not using their funds for the

support of research under the dual support system scheme and agreement that they should have been doing and that is one of the reasons for transferring money in that direction so as to ensure that that happened.

(*Dr Brundin*) I do not know what the evidence to support that statement would actually be because, as I say, my belief is that it is precisely the reverse. I mentioned the problem of capital funding and if you want to get into tedious things like building maintenance and so forth, one of the reasons we have problems at the moment is because we have arguably not been spending enough money on that sort of activity. The reason is because we have pulled money out of that expenditure heading to try to ensure that we deliver what we have agreed to deliver on the increasing volume of research activity which is going on within the university system.

Chairman

167. As I understand it, you are speaking for your own university when you say that. Would your colleagues echo what you have just said?

(*Dr Edwards*) I think what has happened is that money has been pulled in from other programmes to support the research associated with specific grant-aided research from Research Councils and charities, and it has been done, as Dr Brundin said, by not spending as much as we ought to on building maintenance, by not replacing equipment generally as fast as we ought to and as much as we would like to and by changing staff/student ratios in other parts of the university, so that those individuals have less time to do research. In other words, we have been in many cases transferring money to support the research that comes from outside grants by reducing the research opportunities, particularly, I have to say, in the arts and social sciences, because there is no grant-aided research there.

(*Professor Sir Eric Ash*) Can I say that I take very much the same view but if I can put it in slightly different words, the thing we are absolutely sure about is that if we win a Research Council grant and we are then given 40 per cent or 33 per cent or 29 per cent for indirect costs, we know that is totally inadequate. We know the figure is nearer double, nearer 80 per cent, so that money has to come from somewhere else. But I agree with what Dr Edwards says. One of the places it certainly comes from is the money which has been allocated, I presume, to enable us to start some "blue sky" research without going to the Research Councils in the first instance. That is the bit that has certainly suffered as well as maintenance of buildings and a few other things.

Lord Dainton

168. Does that mean it is going to be very difficult for the able young person not yet of the stature and, what shall I say, well-known status, who has a new idea, to be able to make successful applications to Research Council to find funding?

6 March 1991]

DR C L BRUNDIN, DR K J R EDWARDS,
MR S A MOORE and PROFESSOR SIR ERIC ASH

[Continued

[Lord Dainton Contd]

(*Dr Brundin*) Yes it is increasingly difficult to meet those sorts of needs. We do our best to ensure that we do but, as I say, it is increasingly difficult to provide that sort of support which we would see as an essential part of our overall activities. I wish to illustrate the reason I think Sir David Phillips has actually got it backwards in connection with the discussions which are going on currently about the transfer of funds from the UFC to the Research Councils, we have conducted a rather detailed exercise to try to identify absolutely clearly the real expenditure, as Sir Eric mentioned, so there can be no disagreements about what sort of support funds are available. On the basis of the analysis which we have done, it is quite clear that the sum of money which would need to be transferred from the Funding Council to the Research Councils to provide the adequate support for these grants which we have to put into them is substantially larger than the sum of money which the Funding Council currently passes to us under that category. So if the transfer of funds is going to be on the basis of what the real costs are, the rest of the system is going to suffer in another way because it is simply going to pull additional money out of the Funding Council grants over and above what is currently in that category.

169. I can understand that perfectly, Dr Brundin, but it seems to me that the Universities' Funding Council must also understand it because you relate directly to them in relation to the supply of public funds and yet we were told that the Universities' Funding Council has little or no input into this whole discussion of transfer of funds and, in fact, Sir David said he saw very little in the area of researchers where there could be useful discussion between the Funding Council and ABRC. Is that your view?

(*Dr Brundin*) He would be wrong. I would find that a disturbing view. It seems to me that is an area where there ought to be substantial dialogue.

(*Mr Moore*) Thank you, Chairman. I just wanted to come back to your comment about funds being diverted on research. If you would allow me to make one parochial observation in respect of a matter which has had some publicity lately, which is Jodrell Bank. It is probably more than just now, but on last year's figures it cost £800,000 a year out of other resources and it is essentially a research institution that is clearly underpinned by the University out of other resources. We have costed this very carefully as a research activity within the University of Manchester.

Chairman

170. In the event that UFC money is transferred to the science vote, how much of that £800,000 would you expect to lose?

(*Mr Moore*) The £800,000 is the net cost to the University of Manchester. We have allocated within the offsetting income, as it were, within our internal

account, DR money to Jodrell Bank so that £800,000 is the net amount of resources that the University puts into the support of Jodrell Bank. It is very difficult to know exactly what that might increase by if there is a switch of resources from the UFC, because I am not entirely clear what the norm will be although I am concerned about it.

Lord Dainton

171. May I pursue this one second further because it is important, my Lord Chairman. Of course when that money is transferred from the UFC and you get more from the Research Council but offset in part from net funds, nevertheless there will be less for the UFC to distribute to you amongst other universities?

(*Mr Moore*) Correct.

172. So that money is circulating.

(*Mr Moore*) It is circulating.

173. And apparently generating little benefit?

(*Mr Moore*) That is my view.

Chairman

174. Since Mr Moore is speaking I wonder whether I can ask him to go a little bit further. You come from the north-west and it seems to me in the north-west you are in considerable jeopardy because you make use in Manchester, as do your colleagues in Liverpool, of the Nuclear Structure Facility and the Electron Synchrotron Radiation facility. Chemists and biologists and material scientists all use the facilities and of course you have Jodrell Bank, and astronomers who may use other telescopes for all I know. All of that is there at the moment.

(*Mr Moore*) Indeed, that is the case.

175. I would like to ask you not so much about the nature of the science involved—but by all means say a word about it if you wish—what I want to ask you is to what extent you—that is universities in plural in the north-west—have been involved in discussions between yourselves and the Research Councils about management of the problems which will arise if any or all of these facilities are restricted or removed?

(*Mr Moore*) We have not been in joint consultation with the Research Councils about this but I think that we should be in joint consultation. Could I just make two points. Though these facilities that you refer to are located in the north-west—and I think it is rather unfortunate that a substantial group of facilities which are under some kind of threat are located there—they are national and international facilities so that the loss of these facilities, or the severe curtailment of facilities, will not have just a north-west focus but a national and international focus as well. One activity that you did not mention, in which Liverpool and ourselves have been discussing the future with the UFC, is the

6 March 1991]

DR C L BRUNDIN, DR K J R EDWARDS,
MR S A MOORE and PROFESSOR SIR ERIC ASH

[Continued

[Chairman *Contd*]

Universities Research Reactor. That is an activity that we are talking with the UFC about the future of at the moment. So there is a concentration of facilities and I think it would probably be sensible for the old Victoria universities—if I can put it that way—to talk together about how we might manage them but at the moment we have not done it.

176. Is the UFC tending to take the view that this is all a matter for the Research Councils apart from the Reactor?

(*Mr Moore*) If I might just say something about that. That is my impression. I have spoken to Sir Peter Swinnerton-Dyer about the future, in particular, of Jodrell Bank because I think the point that Dr Brundin made, about the distribution of resources, throws up a particular problem in that case. The UFC methodology of the distribution of resources, its formula funding, really does not make any provision for an activity like Jodrell Bank which is special. It is not student supported and the formula funding is essentially driven by student numbers. Jodrell Bank has relatively few students. It is a facility which is essentially a national and international research facility, but it is not easily taken account of within the UFC formula fundings. The UFC supports to some extent Jodrell Bank, and that is taken account of in the net figure I gave you of £800,000. When I spoke to Sir Peter Swinnerton-Dyer to see whether or not the UFC was able to offer any additional assistance with regard to that facility, he informed me he did not think they could because Jodrell Bank is a national and international facility which should be supported by the SERC. Sir Mark Richmond told me the SERC did not have enough money to support Jodrell Bank, so we were caught between the rock and hard place in respect of this substantial expenditure, which is being funded by the University of Manchester out of other activities.

177. It is fair to draw the conclusion that in all this buck-passing you have mentioned, nobody is taking responsibility for the health of the university system as a whole?

(*Mr Moore*) Yes.

Lord Porter of Luddenham

178. May I ask all four gentlemen, Lord Chairman, a rather general question on what we have just been talking about, funding apart and mechanisms for funding apart for the moment. How do they feel about the advisability and trouble and so forth of such national and international facilities as Jodrell Bank and even Daresbury being attached to a university? I do not need to go through the reasons for the question, but, for example, the advantages of staff being able to teach as well as being able to do this research and not going off the boil when their research is not going well. There are many advantages. On the other hand, of course, there are very many disadvantages for universities, but how do university vice-chancellors view the prospect of having a rather big elephant in your

backyard but nevertheless one which would give some advantages to the staff and teachers at the universities, or should it be a Research Council?

(*Dr Brundin*) Perhaps I could begin the answer because prior to my arrival in this country nearly 30 years ago now I was associated with a large institution in Northern California that does this sort of thing on a very large scale. The two radiation laboratories are both administered by the University of California at Berkeley but they are quite separately funded. There are, indeed, benefits and a cross-flow of staff between the parent institution and the research institution but it is also very clear that the flows of funding are separate. My fear about the scenario which you paint is that we would end up simply having the Jodrell Bank scenario repeated over and over again: "It is your institution. It is up to you to find the funding to support that institution." I think there are actually quite close links between many of these research institutions and more than one university. It is perhaps very desirable to continue to make it clear that they are central facilities rather than tying them too tightly to a single institution. You mentioned Daresbury in the context of the Victoria universities. There are large parts of my own university's research activities which would be seriously inhibited and, indeed, would probably have to cease completely were Daresbury to be closed. We are heavy users of the Daresbury facilities.

Chairman

179. Could I go on to discuss with you something that is very central to what we are talking about. It has been put to us in writing and in evidence from Sir Mark Richmond that the real problem is the different situation in which flexible funding and inflexible funding take place. Research grants funded in the responsive mode are what you might call flexible, and the rest, the directed work, the work that involves staff appointed for long-term appointments, the national and international facilities and so on, these cannot be cut back that quickly and, therefore, they are inflexible, and it is the flexible part that has been "clobbered" this year. One response to this is that SERC in particular did not ring-fence its flexible funded things, or alternatively, it gambled a bit with the result that it could only cut the flexible part of its budget; or you can say that, on the contrary, SERC simply allowed too small a proportion of its budget to be used on flexible things, the responsive mode. They have IRCs in great profusion—not great profusion but they have a number of IRCs in recent times; they have all sorts of fixed commitments. It has been a matter of policy to have directed programmes. Has that process gone too far in the opinion of your four witnesses?

(*Professor Sir Eric Ash*) I will make a start. You will, of course, my Lord Chairman, get a different answer from those universities that happen to have some IRCs from those that do not. In fact, if I can

6 March 1991]

DR C L BRUNDIN, DR K J R EDWARDS,
MR S A MOORE and PROFESSOR SIR ERIC ASH

[Continued

[Chairman Contd]

link my answer to the question that Lord Porter asked as well—how big an elephant we do want in our backyard—my answer to that would be, not very big. I certainly think national facilities ought to be run nationally. The IRC is a sort of intermediate situation and that is part of your inflexible funding. I believe myself that there is a strong case for IRCs. I do not know that there is a need greatly to expand them at the moment, for the reason that you implied, but it does actually reduce the amount of flexible money which is available. However, I believe that, rightly handled, the IRCs can produce value in excess of what could be produced if the same project were split, because there are some things where you need to have resources which are all in one place, or nearly all in one place. I would just like to say one more word about the question of the extent to which major central facilities should be associated with a university. We are currently facing a major problem here with regard to the super-computers and that is currently under discussion between the UFC Computer Board and ABRC and it is not at all obvious to me that super-computers should necessarily be associated with individual universities. I think it might well be possible to run them as efficiently, or possibly even more efficiently, if they were a national resource used nationally. But on your main question, I believe that the shortage of funding has hit the Research Councils and particularly SERC with its devastating impact on the flexible funding. That is a situation which I very much hope we can avoid in future.

180. What is it due to?

(*Professor Sir Eric Ash*) I think possibly it is due to an imbalance between the voting of resources to the flexible/inflexible side. On the other hand, I think it was possibly an allocation based on the assumption that the overall funding of the science base would continue with at least a positive rather than a negative slope and that is an expectation which has been disappointed.

(*Dr Edwards*) I think, my Lord Chairman, that must be right, that the proportion devoted to flexible funding must be such that it relates to the fluctuations from year to year in the size of the grants and obviously if those are going to be very high that is the only element which would be hit, in which case one would hope to see a high proportion of the Research Council budget devoted to that method of flexible funding unless they can be reasonably sure of the baseline. On the question of the elements that are devoted to the fixed costs, such as IRCs, we have an IRC developing in the University of Leicester which is an MRC one on the mechanisms of human toxicity. That might be a good model for combining a nationally funded facility, which is the MRC Unit on Toxicology, which will continue to be funded directly by MRC and they will be employees of MRC, into a university campus, and I hope we may get the best of both worlds, but maybe I am too optimistic.

(*Dr Brundin*) Speaking from a university which does not have any IRCs, we have managed to come second on a number of occasions, which some people speculated was perhaps the best possible result. The benefit of getting IRC funding, of course, is that the institution is then able to do more rational forward planning than they are able to do if they are dependent on the flexible funding, because once you get the funding within the institution you are really using it to support the same sort of programme but you have a guaranteed level of support over a period of time and you can do rational forward planning because you know that the guaranteed support is there.

(*Professor Sir Eric Ash*) Semi-guaranteed.

(*Dr Brundin*) Yes, all right, but otherwise what the worry was about was the shift from flexibility to targeted funding.

181. I do not want to hog the questions and I will shut up in a moment but there is one further bit on this flexibility/inflexibility distinction that I would like to ask you about. People tend to talk as if ordinary research grants are the flexible money and all fixed facilities are the inflexible part and, of course, the fixed facilities are fixed and, therefore, inflexible, but the Research Councils give money in the responsive mode of funding for beam-time, so to speak, on those facilities, the neutron facility, the synchrotron radiation facility, the telescopes, super-computers, if you can talk of a computer beam. So it is not right to refer to the expenditure on these fixed facilities as if it were all inflexible. It is not. The use of them is just the same as any other research grant. Would you care to comment?

(*Professor Sir Eric Ash*) I would agree with that comment. Some of the major facilities and certainly the Synchrotron Radiation and various facilities in this country and France come into that category. The high energy particle physics facilities do not come into that category.

182. And space?

(*Professor Sir Eric Ash*) And space, I suppose astronomy is somewhat intermediate because there is the equivalent of "beam time".

(*Dr Brundin*) To pick up that point, the commitment of fixed money on a large scale can lead—as I believe is very much the case at the moment—to the under-use of the facility because the flexible money in terms of beam time and so forth is then significantly reduced and you are in the curious position of having committed a large amount of money for the support of the facility which is now being under-used because the flexible money has been pulled out in order to continue to provide the base-line support. I think that is the point you were seeking.

Lord Kearton

183. This brief you sent us on science funding in the UK and its universities was most helpful and it does bring out the extraordinary advances and

6 March 1991]

DR C L BRUNDIN, DR K J R EDWARDS,
MR S A MOORE and PROFESSOR SIR ERIC ASH

[Continued

[Lord Kearton Contd]

efficiencies that the universities have made, something which I do not think the government or general public fully appreciate. But assuming the financial stringencies continue, would the next step be to reduce the number of campuses at which research is carried out? You represent the rather large universities but if we are stuck with a fixed amount of money would it be better spent on fewer campuses?

(Dr Brundin) That is a very difficult question to answer because I think it has to be looked at alongside what it is we are actually trying to achieve by supporting research. It is not only significant output from particular research projects, it also has within the university system the extremely important function of actually training the next generation of research scientists, most of whom are not going to stay in universities but are going to go out into the wider world where there is a steadily increasing demand. The risk in the sort of concentration that you are suggesting is that there would be an inevitable diminution then in the number of scientists we are actually training to feed out into the rest of the system. If I could just quote a Transatlantic statistic to back up some of the figures which are here. The percentage of the age group which has access to what the US would classify as research universities, which broadly speaking corresponds with the whole of our university system, is already greater than the percentage of the age group which has access to our whole university system, so arguably we ought to be going in the opposite direction and not be talking about reducing the size of the university system but increasing the access to the research-based system.

184. Could I continue for a moment. I am not suggesting for one moment a reduction. What I am trying to bring out is if there is no increase in funding, the evident consequence would be a reduction and that would be a bad thing.

(Dr Brundin) Yes.

Chairman

185. Did Sir Eric want to answer to Lord Kearton's question?

(Professor Sir Eric Ash) Only very briefly, and that is that there is already a very considerable diversity in the percentage of the total costs of universities that are devoted to research. It is already a very skewed distribution. I believe that it is likely to become even more skewed. I do not think it will be so on the basis of a university going out of research. I think one will find there are departments which are very active in research and, even in relation to universities when there is a relatively small commitment to research overall, I think the kind of thing you are pointing to is happening and will continue to do so.

Lord Kearton

186. It will accentuate the situation of the last distribution of the UFC.

(Professor Sir Eric Ash) Yes.

Lord Butterworth

187. My question is really an extension of this. It has been put to us that one of the developments that could occur is the putting together of the University Funding Council and the Polytechnic Funding Council in a single body. If that were to happen what would be the consequences for research in universities?

(Dr Brundin) I think it depends a great deal on whether one accepts that within the system as a whole there should be a diversity of roles. There has been a lot of discussion over the so called RXT model for institutions. I believe we already have a RXT system in this country. The Xs, broadly speaking, are the polytechnic sector. The Ts, broadly speaking, are the further and higher education sector, which forms a part of higher education in countries where the comparison is being made. I would not see that changing significantly. I think it is probably better to avoid tight classifications where you say, "These institutions are the only ones that are allowed to do this. These are Xs therefore they are classified as being in the intermediate category." The putting together of the two funding councils would produce a greater degree of flexibility. My next point is that along with some concentration in a relatively small number of institutions, I suppose, the benefit in the system as a whole would be that the pockets of excellence could develop in a wider range of institutions than is the case at the present. I would not see—unless it was felt you had to spread the butter thinly over a large system rather than continuing with the present targeting system of funding—it having dramatic effects.

188. The more one has, in the sense, external forces determining your direction within the universities—for example the department of, say, physics is not getting large research grants and therefore not getting the ratings and not getting the money from UFC either. Increasingly a larger proportion of this money coming from those two sources in the universities makes it very difficult for you to reverse something which you want to see reversed. How does a university transform a department from one that is going downhill to one that is going up?

(Dr Brundin) That is why we need this cushion of untargeted money that we can use for our internal purposes. As far as my university is concerned my aim is to have nothing but high quality and I would wish to do precisely what you have suggested and if a department is going down you have to have access to resources to build it up again.

189. Are the trends that I have indicated, both in the transfer of monies, the formula-funding of the

6 March 1991]

DR C L BRUNDIN, DR K J R EDWARDS,
MR S A MOORE and PROFESSOR SIR ERIC ASH

[Continued

[Lord Butterworth *Contd*]

UFC side and the role of the Research Councils in the present situation, are they driving you in the other direction?

(*Dr Brundin*) Yes, definitely.

190. We were told by Sir David Phillips he saw little point in the discussions between the ABRC and UFC because their roles were very distinct. I almost got the impression—I hope I am not doing him a disservice—he thought that the real discussion should take place at university level despite the difficulties to which you have referred. What is your view on that?

(*Dr Brundin*) I would myself hope that the UFC was included in the discussion because overall the UFC is our funding arm from the Government and if you are talking about something where there is inevitably going to continue to be a division of responsibility between the two funding bodies, surely both of those funding bodies need to have a clear understanding of what the funding needs are.

191. We were told, I think, this morning that these discussions were only of a very informal character and, for example, cross-membership no longer exists.

(*Dr Brundin*) That is correct and I share the concern about that.

Chairman

192. You gave capital expenditure as a very good example.

Lord Carver

193. We have been told that the health of British science depends on two things: one is the provision of adequate and up-to-date facilities for the scientist to work in and the other is that staff should be paid adequate salaries because there is a tendency for neither to exist and that is why the “brain-drain” is supposed to exist. If you are going to ring-fence all the flexible side, which we have been talking about quite a lot, then you must un-ring-fence the inflexible side and, therefore, the result of that will surely be to tend—and we seem to be saying it is liable to happen—to reduce the number of large, modern, expensive facilities, so that strikes a blow at the side. But we have not talked this morning at all about salaries and presumably the scientific community and perhaps the academic community, too, welcome the increases in salaries for scientists to what is more comparable in other countries, but we have had lots of complaints that grants, both through Research Councils and through the UFC, are not keeping up with the increasing salaries. If you have now got a situation in which you are liable to cut down on modern, up-to-date laboratory facilities and you are not going to keep up with salaries, what is going to be your answer to the problem?

(*Dr Brundin*) When you said the inevitable consequence is that either side has to be cut back, that is if you begin from the assumption that the

resources are actually cash limited at an inadequate level. My answer to the problem is very simple and that is that it is essential that this activity is funded adequately and that it is misguided to continue to believe that one can run such activity on the basis of inadequate funding. The costs of any labour-intensive activity rise not with the RPI but with the GDP and we have for a number of years now—and this is over the whole of the science funding—been funded on an inadequate definition of RPI and a complete failure to recognise that our costs inevitably are going to rise more rapidly than the RPI. The percentage of GDP which has to go into these activities needs to remain approximately constant and arguably it should increase, but it certainly needs at least to remain constant. That has not been the situation for a number of years now. So my answer to your question is really very simple. There is only one answer and that is increased funding.

Lord Porter of Luddenham

194. I wonder whether that is so. The brain drain that Lord Carver referred to, there has been a lot of investigation into it and in so far as there is a brain drain—and there is—it is a brain drain of our very top people, our very best people, particularly into the United States. The reason is huge salaries, much greater salaries, but only for them. The salaries in the United States in the higher education institutions are lower than our standards. I know a little has been done recently but is there not more scope within the universities to have a far greater spread of salaries recognising excellence?

(*Professor Sir Eric Ash*) If I may respond to this, I believe the answer to the question is yes. You were making the comparison with our competitors, competitor universities in the United States. In the United States there is no salary structure at all. Salaries are determined by performance only and I think it is essential in this country that we move in that direction. It is, of course, difficult to do at a time when salaries are depressed to the extent that they have been in the university system, and they have been depressed very seriously, something like 35 per cent with respect to other comparable professions in the last 10 years. I believe, however, it would be entirely possible to have total flexibility of salaries at the professional level and that, I think, would be a marvellous start. I think it is something we should do and I know that there are many professors, possibly a majority, who are in favour of moving in that direction.

Lord Dainton

195. But you have had that flexibility for some years.

(*Dr Brundin*) To a large extent that is an internal management question. We already have such flexibility within my institution.

(*Professor Sir Eric Ash*) Can I clarify what I mean by “flexibility”. I mean the possibility of not paying cost of living increases to professors. We do not have

6 March 1991]

DR C L BRUNDIN, DR K J R EDWARDS,
MR S A MOORE and PROFESSOR SIR ERIC ASH

[Continued

[Lord Dainton Contd]

to at the moment and that is a situation which obtains in the United States and which obtains in industry and commerce.

(*Dr Brundin*) That is a subject on which there is a difference of opinion. It is probably not worth going into any detail here but if I could pick up on your statement about comparability across the Atlantic, I think we are not comparing like with like because let us remember that the North American definition of higher education includes the whole system. If you compare salaries in the research universities in North America with salaries in our university system in this country, which is the legitimate comparison, you will not find the bottom end being lower than what is paid in this country. You will find the comparability is in the other direction. If you look at the statistics for the system as a whole you are actually going right down through the FE colleges in this country.

Lord Porter of Luddenham

196. Would that be true of, say, Renselaer Polytechnic, which is certainly not a research university, and the salaries of professors there are really not low?

(*Professor Sir Eric Ash*) I believe it would be true, even for RPI.

(*Dr Edwards*) I would like to add an additional point to this discussion about salaries. It seems to me that the key thing is career prospects as well as

salaries. What does the young scientist thinking of entering into a research career see ahead of him or her, and I think that variations in funding, variations in opportunities, are very discouraging. Even if the salaries were very good I think that would still be true.

(*Dr Brundin*) Let us remember that a professor in America runs down to the bottom of the lecturer grade in this country. We are not comparing professors with professors because every permanent member of the teaching staff in the United States is a professor.

197. An assistant or associate?

(*Dr Brundin*) Yes.

Chairman

198. I think we must in all conscience let you go in the very near future. I will give you a chance to say anything else you would like to say which you have not already said before we finish but are there any quick questions from any Member of the Committee? No. In that case, are there any things any of you would like to say to us before we finish?

(*Dr Brundin*) Chairman, I think we covered the points that we were particularly concerned to cover in the written submission which we gave you before coming here this morning and, therefore, I do not myself have anything I would wish to add.

Chairman] Then thank you all very much for coming. It has been a very productive session.

WEDNESDAY 20 MARCH 1991

Present:

Adrian, L	Kennet, L
Butterworth, L	Kirkwood, L
Dainton, L	Nicol, B
Flowers, L (in the Chair)	Porter of Luddenham, L
Gregson, I	Taylor of Blackburn, L

Memorandum submitted by the Department of Education and Science

1. The aims of the DES science programme are to advance knowledge and technological capability; to train scientific manpower at postgraduate level; and in these and other ways to contribute to the realisation of economic, social and cultural benefits for the United Kingdom. The Department's expenditure plans consist of (a) the "science budget", namely the sum allocated by the Secretary of State on the advice of the Advisory Board for the Research Councils (ABRC) for distribution to the five Research Councils and other funded bodies; and (b) certain receipts from European Community programmes which accrue directly to the Research Councils and funded bodies. The provision for science announced by the Secretary of State on 8 November 1990 breaks down as follows:

	<i>£ million</i>		
	1991-92	1992-93	1993-94
Science provision	927.6	1,030.2	1,112.8
Of which			
EC receipts	6.8	6.8	6.2
Science budget	920.8	1,023.4	1,106.6

2. After making adjustments for PES transfers, the rescheduling of postgraduate tuition fee payments, and the significantly reduced capital requirement from 1991-92 onwards, the value of the underlying science budget has been maintained in real terms. A full account of these adjustments is given in the Secretary of State's letter of 8 November to Sir David Phillips, the Chairman of the ABRC, reproduced at Annex A; the detailed figures are given in the table at Annex B.

3. Two capital items have been discounted from the 1990-91 science budget for the purposes of this comparison. The first is the Royal Research Ship James Clark Ross, for which an earmarked capital allocation was made in 1990-91; and the second is the administrative building to provide permanent accommodation for the headquarters staff of the two Research Councils which have recently moved to Swindon. The virtual completion of these exceptional capital items in 1990-91 is reflected in the science capital line in Table 11.1 of the DES Departmental Report (The Government's Expenditure Plans 1991-92 to 1993-94) published in February as Cm 1511, which shows the following capital and recurrent provision for 1990-91 (estimated outturn) and 1991-92 (plan):

	<i>£ million</i>	
	1990-91	1991-92
Capital	174	150
Current	732	778
Current less EC receipts	727	771

4. Hence, after allowing for these adjustments, the recurrent funds available for allocation by the Secretary of State on the advice of the ABRC in 1991-92 are 6 per cent higher than the equivalent sum in 1990-91, and this is the basis of the Secretary of State's statement that the underlying value of the science budget has been maintained in real terms. The Government's plans allow for the 1991-92 value of the science budget—both recurrent and capital elements—to be maintained in real terms during the two following years. Against this background, and having regard to the increased public funding for the universities (themselves a key element of the science base), the Secretary of State believes that the 1991-92 science budget "provides the basis for the continuing development of the country's science base".

THE DISTRIBUTION OF THE SCIENCE BUDGET

5. Once the Secretary of State has set the size of the science budget, he looks to the ABRC to advise him on its distribution between the funded bodies. This stems from the longstanding tradition in the UK that the scientific community should play a decisive part in assessing and determining the relative claims of competing scientific programmes and projects upon the finite resources which the Government judges the country can afford. The Secretary of State is predisposed to accept the ABRC's advice and did so in 1990 and again this year. The allocations flowing from these decisions are set out in Annex C.

6. Once these allocations have been made, it is for the funded bodies to live within the resources they know to be available to them. While they can make a case, through the ABRC, for additional resources in subsequent Public Expenditure Surveys their planning should not assume the success of such bids.

*20 March 1991]**[Continued]***CHANGES TO THE DUAL SUPPORT SYSTEM**

7. The Secretary of State announced on 8 November 1990 that new arrangements will apply from 1 August 1992 to the funding of Research Council supported projects at Higher Education Institutions. From that date the Councils will become responsible for meeting all the costs of such projects, apart from the employment of academic staff and premises costs. To reflect the change in responsibilities of the Councils and the institutions, there will be a corresponding financial transfer of resources from the UFC to the science budget.

8. The intention is that the effect should be financially neutral for the system as a whole. The change in the dual support boundary relates only to the funding of research; it should have no effect on the universities' teaching function. Within the research function, the change should not in itself have any effect on the volume or nature of Research Council funded projects. Under the new arrangements the Councils will continue to consider applications for grants as at present but where they decide to support a project they will be expected to meet all the costs other than those associated with premises and with the employment of academic staff.

9. Nor should the change affect the capacity of Higher Education Institutions to maintain the "floor" of research capability. Currently the Universities Funding Council (UFC) estimates that some £830 million of the funds it provides to universities is available to support research. The dual support transfer involves redirecting the element of those funds—estimated to be about £100 million pa—which cover costs which will in future be met by the Research Councils. These funds will be returned to the institutions as part of project funding. The remaining funds allocated through the UFC will continue to be available for institutions to use at their own discretion to support research.

10. The Government's policy in relation to research, as in other areas, is to secure the best value for money from the use of public funds. To this end it supports the trend in the allocation of research support by the UFC towards greater selectivity, based on an assessment of the quality of research in each department and institution; this will encourage universities to build on their strengths. Alongside this institutional selectivity, the funding of specific projects through the Research Councils allows them to select according to the scientific excellence of individual projects. All institutions are free to apply to the Research Councils for project grants. The new arrangements will encourage institutions which are not otherwise strong in research to submit applications for specific projects since a higher proportion of the costs of such projects will be met by the Research Councils. In this way they will increase flexibility within the funding system.

11. The implementation date was set for August 1992 in order to give time for smooth implementation of the new system. At the Secretary of State's request, the Research Councils and the CVCP are currently working on the detailed methodology to be used within the new arrangements for dealing with overhead costs. The methodology will build on the methods used within universities to allow for overheads when costing research to be undertaken for outside bodies, including industry.

12. The Government expects the new arrangements to be a considerable improvement over the current arrangements. The change is being introduced following lengthy consultation, and in response to advice from the ABRC. The Board reported that the division of responsibilities between institutions and Research Councils had become increasingly blurred over the years. This blurring had harmful effects—giving rise to unproductive and time-wasting arguments about funding responsibility, to some projects being inadequately resourced and so inefficient, and to an inadequate appreciation of the real costs of projects and consequently ill-informed decisions on the development of resources. The new arrangements are designed to overcome these problems by providing a new, clearer division of responsibility which makes more explicit the costs of the work being undertaken.

ANNEX A

**Letter from The Rt Hon Kenneth Clarke QC MP
to Sir David Phillips KBE FRS**

THE SCIENCE BUDGET 1991-92 TO 1993-94

I was grateful for the Board's advice for this year's Public Expenditure Survey on the resource needs of the Research Councils, Royal Society and Fellowship of Engineering.

I am now able to tell you that this year's settlement maintains the value in real terms of the underlying Science Budget.

The Science Budget for 1991-92 will be £920.8 million, and the planning figures for 1992-93 and 1993-94 are £1,023.7m and £1,106.9m. Total provision for Science in 1992-93 includes receipts from the European Community and non-voted public expenditure by the IPSR from privatisation receipts, and will amount to £930.1m.

20 March 1991]

[Continued

Next year's Science Budget includes £1.8m in respect of the transfer of responsibility for national supercomputing services from the Computer Board to the ABRC, and takes account of the rescheduling of postgraduate tuition fees, which results in a reduced requirement on the Research Councils of £8m. The planning figures for 1991-92 and 1993-94 include:

- (a) £1.9m in 1992-93 and £2.0m in 1993-94 for the supercomputing transfer; and
- (b) £50m in 1992-93 and £100m in 1993-94 to reflect the proposed change in the balance of funding responsibilities between higher education institutions and the Research Councils from August 1992. It is possible that these figures will need to be further adjusted next year in the light of the further work I have commissioned from the Board and others.

In order to make a like-for-like comparison between the Science Budget for 1991-92 and that for 1990-91, it is necessary to make appropriate adjustments for the reduced capital requirement from 1991-92 arising, in particular, from the completion of:

- (a) The RRS James Clark Ross, for which an earmarked allocation was made last year; and
- (b) The new building work at Polaris House.

After making these adjustments, the Science Budget for 1991-92 is the same in real terms as in 1990-91. Set against the need to constrain public expenditure generally, this settlement provides the basis for the continuing development of the country's science base.

I am making no earmarked allocations this year and I should be grateful to receive the Board's allocation advice.

Since the Science Budget is a matter of considerable Parliamentary and public interest, I propose to follow precedent by publishing the text of this letter in the form of a Parliamentary answer.

KENNETH CLARKE

ANNEX B

SCIENCE BUDGET: COMPARISON BETWEEN ESTIMATED OUTTURN (1990-91) AND PLANS FOR LATER YEARS

The science budget (i.e., the element of DES provision for science which is allocated on the advice of the ABRC) for 1990-91, and the planned science budget for the three following years, are as follows:

	£ million			
	1990-91 estimated outturn	1991-92 plans	1992-93 plans	1993-94 plans
Science Budget	897.0	920.8	1,023.4	1,106.6
Less transfers:				
Dual funding boundary change			50.0	100.0
Super computing		1.8	1.9	2.0
Subtotal	897.0	919.0	971.5	1,004.6
Less post-graduate fees (to allow for one-off saving in 1991-92): ¹	29.2	21.2	32.4 ²	33.6 ²
Subtotal	867.8	897.8	939.1	971.0
Less one-off capital projects:				
James Clark Ross ³	17.9	2.7	1.7	
Polaris House ³	6.6	0.8		
Subtotal	843.3	894.3	937.4	971.0
These figures represent the underlying science budget provision.				
They yield the following indices in cash terms:				
Index (cash)	100	106	111	115
GDP deflator	100	106	111	115

Notes:

¹ From the academic year 1991-92 postgraduate tuition fees will be paid termly rather than annually, giving a saving in the financial year 1991-92 when Research Councils will need to make only two termly payments.

² Provision for post-graduate fees maintained in real terms at 1990-91 level.

³ Latest estimates of spend.

20 March 1991]

[Continued

ANNEX C

1. 1990-91 to 1992-93

Allocations for 1990-91 and Planning Figures for 1991-92 and 1992-93.

	1990-91	£ million 1991-92	1992-93
AFRC	85.91	91.8	88.4
ESRC	36.01	35.2	35.8
MRC	185.71	192.0	195.2
NERC	135.23	121.3	117.1
SERC	438.62	437.7	444.5
Royal Society	13.94	15.35	15.37
Fellowing of Engineering	1.19	1.36	1.41
ABRC (Secretariat, Science Policy Studies and CEST)	0.41	0.34	0.38
Flexibility Margin	—	17.4	36.7
Total	897.02	912.6	934.9

2. 1991-92 to 1993-94 (24 January 1991)

Allocations for 1991-92 and Planning figures for 1992-93 and 1993-94.

	1991-92	£ million 1992-93	1993-94
AFRC	93.47	90.53	91.58
ESRC	35.51	37.24	37.71
MRC	200.42	206.35	208.80
NERC	122.56	119.99	121.28
SERC	451.30	462.96	469.16
Royal Society	15.74	15.77	15.97
Fellowship of Engineering	1.39	1.44	1.46
ABRC (Secretariat, Science Policy Studies and CEST)	0.44	0.48	0.50
Unallocated*	—	88.68	160.13
	920.83	1023.4	1106.6

*Including £50 million (1992-93) and £100 million (1993-94) consequent on new arrangements for funding of scientific research in higher education institutions.

Examination of Witnesses

RT HON KENNETH CLARKE, QC, MP, Secretary of State, MR D WILKINSON, Under Secretary of Science Budget and MR N SANDERS, Head of Finance Branch, Department of Education and Science, called in and examined.

Chairman

199. Secretary of State, it is very good of you and your colleagues, Mr Wilkinson and Mr Sanders, to join us today. It seems only a short time ago that we were discussing priorities in medical research with you and it turned out to be a very fruitful discussion, I remember. Today, as you know, we are concerned with the science budget as a whole and especially with what appears to be the crisis effect that it has had upon the affairs of the Research Councils this year and through them upon research in higher education generally. Rather than rehearse the whole thing before you we would prefer, if you agree, to ask you if you could comment on a number of specific issues, of which we have given you notification, which we sent together with a very brief summary of the factual position as we see it at the moment. But before we turn to these specific matters we would in any case ask you most cordially whether there is anything that you would like to say by way of general introduction before we start?

(Mr Clarke) My Lord Chairman, my Lords, it is very good to be back here again and I agree that the last appearance did have rather fruitful results and

Mr Peckham is now in post I think and various other factors having taken place. On today's subject firstly I do not accept that there is any kind of crisis in British science either in the performance of British science or in its funding this year and the level of funding of British science has risen quite significantly in real terms over the last decade. It experienced a considerable hike, an 8 per cent real terms increase a few years ago and we have sustained that increase in the planning that we have made and I believe that a sensibly planned science budget, for which I am responsible, will allow British science to continue to achieve the standard of excellence that it has done in recent times. The underlying problem is that there is never any limit to the number of things that can be done by way of scientific research and there are all kinds of questions you can ask about how you can develop areas within the science budget. The most important question of all is what are you not going to do because the only way forward, I think, for a country like ours is to select those particularly high priorities within the area of science which we believe have the first call on resources and concentrate on those in order to achieve a level of excellence and I have to say that.

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued]

[Chairman Contd]

But I am glad to say that I get a lot of advice from advisory committees and people with many more scientific skills than myself or even Mr Wilkinson and my Science Division. I normally accept their advice and they are faced with the very hard task of firstly the easier bit of selecting that which they are going to continue to fund and put their funds in and then the difficult bit which is deciding which projects which might be perfectly worthwhile but they are not able to be afforded by a country like our own on the level of science budget we have got. I think that far too much of the discussion concentrates on the second bit because every time one of my Research Councils recognises that we should stop something or close something it is very easy to make out a general case for saying that it is worthwhile—and the same debate is going on in every other country—but some worthwhile things have to be dropped because it fails to achieve the right priorities within a science budget such as our own.

200. Thank you very much. No doubt my colleagues and I will raise many of the points that you have just mentioned in the course of the afternoon. May I just start off by saying that I certainly do not want to bandy words with you about the proportion of GDP devoted to science. We know your views as they were clearly stated in the House of Commons about a month ago but I am very concerned to ask you this: in settling what the science budget to the ABRC and through them the Research Councils is to be, is any account taken of the contribution of the UFC budget that is made towards scientific research in the universities. You see it is our belief on the basis of the figures that we have had—and may I say thank you to everybody who has been so helpful in giving us figures—even if the ABRC growth is positive then ABRC plus UFC is negative, if I may put it that way. It is very important in measuring the total amount of money going to science that you take into account both sides of the dual funding system and that involves the UFC proportion as well. We would like to know whether that is taken into account when settling the ABRC budget?

(Mr Clarke) I shall ask Mr Wilkinson to comment on the figures in a moment because I do not instantly recognise the claim you made that if you put the ABRC and UFC contributions to science together there is a decline taking place. We have a dual system which means the Research Councils allocate grants to specific projects and also some training as well and then universities are funded at such a level that provides not only for teaching but it is usually acknowledged that about 40 per cent on top of that to cover the research costs of the university. We are changing the boundary between the UFC funding and the Research Council funding with a transfer from one to the other. It is intended to clarify the responsibilities of the Research Councils and universities for what they fund. Given that university funding has not gone into decline neither has the ABRC, I do not see how

you can put them together and produce the result you claim but Mr Wilkinson is more familiar with the statistics and the figures than I am.

201. If I can ask Mr Wilkinson to take this point into account that the transfer is something for the future. The figures that we have referred to are the near past and it is our belief that the amount of money going from the UFC into research has not been going up in proportion to the total UFC budget with the result that the total going towards research has not been going up as fast as you would think, just looking at the ABRC component, and may even be a bit negative possibly.

(Mr Clarke) For the latest year the amount of funds which the University Funding Council has given to the university in block grants for the purposes of scientific research, excluding the humanities, is £750 million which added to this year's science budgets of around £900 million means that the science base as a whole is £1,600 million. The resources overall for universities over the past 10 years have increased by some 10 per cent. The distribution of those resources through the UFC in accord to teaching related criteria and research related criteria is a matter for the UFC and I think it is fair to say that the rate of increase on the research-related criteria has not been as great as the increase in the science budgets but overall there has been an increase in the science base over this period.

Lord Dainton

202. Is this in real terms, can I ask?

(Mr Clarke) Yes, this is in real terms.

203. Running back to what year?

(Mr Clarke) Running back to 1979-80.

Chairman] Thank you for these figures, which are helpful. May I ask Lord Butterworth to pursue the issue of indexation.

Lord Butterworth

204. The Government, as I understand it, reckons the value of the underlying science budget has been maintained in real terms. Many witnesses have come to us and said that will only be true if inflation in the current year is running at 6 per cent or less. If it is more, then one of the difficulties is that of under-indexation.

(Mr Clarke) Yes, I agree with that. We produce figures to the Committee showing what we believe to be level funding in real terms and if the GDP deflator next year is 6 per cent, that is so, and it is true also of our planning totals for the next two years, and the pattern that has emerged from last year's public spending enquiry is maintaining in real terms the large increase in real terms. Really it goes back to two years ago when there was a one-off step increase of 8 per cent in real terms. But you are quite right, Lord Butterworth, wholly correct in saying it is dependent on a statement of 6 per cent for the figure for the GDP deflator, which obviously depends on

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued]

[Lord Butterworth *Contd*]

the forecast and obviously also depends in part on reflections by Mr Sanders and myself on yesterday's Budget.

Chairman

205. Is it the case that the 6 per cent has just been revised upwards to 7 per cent?

(*Mr Clarke*) That is what I had in mind. Yesterday, as a result of the changes, it has gone up to 7 per cent and I have to admit that whilst I wholly welcome the Budget in every conceivable way as a member of the Government, from the point of view of the science budget very little community charge comes out of the science budget but the VAT does. So at the moment, 24 hours later, I think Mr Sanders and I would say we are now looking at the consequences of the 7 per cent figure and Mr Sanders, who is the financial guru of the Department, is looking up the relevant passage in the Red Book, which I could read because I had not spotted it until he found it for me: "Some additional effect will fall on the central government programmes as a consequence of the increase in the rate. The total amount is estimated to be around £450 million in general, which is to be absorbed within existing provision. Where this is not done it will be taken as a charge on the reserve and will not add to the planning total." That is as far as we can go this afternoon but certainly the papers I put in on level funding were based on 6 per cent and the VAT change has taken it to 7 per cent.

206. There still is some reserve?

(*Mr Clarke*) There is, yes. The Red Book confidently mentions it!

Chairman] I am sorry, Lord Butterworth.

Lord Butterworth

207. No, it entirely follows my line of thought. There are, as you know, many big items in the research budgets which generally are greater than the average and one of these, of course, is salaries. A lot has been put to us, and different points of view, about whether it might be advantageous or not to decouple academic salaries from research salaries because it is argued by some that the research councils have to pay the academic salaries although, of course, they are not a party to the bargain. Have you any views about this kind of problem?

(*Mr Clarke*) I have not heard that kind of proposal. I am not actually directly a party to the negotiations on either footing. At the moment the Committee of Vice Chancellors and Principals settle the academic salaries. They obviously discuss with me the amount of funding for it and I did hold back part of the funding in order to have a discussion with them about the settlement, but as things are, as I understand it, the CVCP has to take into account the impacts of research, including the research council salaries, when settling their figures. I do not know. I think it would be unwise for someone who does not sit down in the negotiations to express off the cuff an

opinion as to whether research councils might or might not want to start negotiating separately with their particular institutions.

208. If we got into the situation where the research councils had rates of pay that were different to those that applied in the universities, I think there are two problems. First, could they achieve those, because they themselves would have to negotiate with the unions anyhow, but let us assume they could. The universities would still be under an obligation to pay the salaries which emerge under their agreements and, therefore, this would be a further loss to the university research vote because they would have to make up the difference?

(*Mr Clarke*) Yes. The universities would pay whatever they had negotiated and this all stems from the fact that people say the GDP deflator is not an adequate index to reflect their costs, which I have to say, with respect, is not unique to the science world. Practically every part of government starts saying it has a different index of costs to the general index of costs, and I sometimes make the general response that as far as the cash raised from the taxpayer by the Government is concerned, that is governed by one index and you really do have to spend money on the basis that you are allocating any cash that is reflected, the GDP deflator itself reflecting the cost of that money to the taxpayer and the general economy, and people cannot really expect volume provision based on their estimates for some separate index. There is also no hard evidence that the science budget as a whole does experience higher-than-average inflation. I suspect it is most unevenly distributed across the field. This all depends largely on particular costs and the particular equipment they are using and also how labour-intensive a particular project is. Some very large projects appear to me to take very little by way of manpower and many go all the way down to a project which is manpower alone, so that it is very difficult to calculate. As things stand, one can only say the pay negotiators ought to bear in mind the consequences of the research budget when trying to work out what they can reasonably afford to pay. Overall, as I say, it seems to have defied everybody trying to measure any consistent index for science which is markedly different from that of the GDP deflator.

Chairman] I wonder whether we might turn to another set of questions to do with annuality, which concerns the Treasury rules under which everybody has to operate. I will ask Lord Gregson to ask a few points about that.

Lord Gregson

209. I wonder whether, Secretary of State, you have looked at this question of annuality with regard to your Department's science budget. You probably know that the MoD had a running fight, if you like, with the Treasury over a number of years. In fact, Pepys was the first man who described the system of accounting as archaic and that now leaves it as being prehistoric on the whole. The idea that

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued]

[Lord Gregson Contd]

somebody can predict the expenditure to 1 per cent over a period of a year on amounts of £300 or £400 million is really quite incomprehensible and the fact that the Treasury cannot estimate their own expenditure within a billion pounds makes it quite ridiculous. The suggestion has been made to us by a number of people in giving evidence that the whole thing should be made easier and simpler if there were an overlap sum of money. If you remember, when I was a member of the National Defence Industry Council there was a negotiation when the Treasury agreed to a 4 to 5 per cent overlap whereby money would be carried over. That would make an enormous difference to the way the research councils work in being able at least to have the security of knowing that if they underspend they do not lose the money. Does that not make sense to you?

(Mr Clarke) It has some attractions because, like you, I have struggled with the problems of annuity sometimes and I agree, if somebody is expected to hit it on the button each year, but what happens is everybody underspends because the only safe way of doing that is to go below. So over the years different parts of the Government have struggled to free up these rules, including the science budget. We will review it, because I think I am right in saying we have had some recent changes where the councils now have a 2 per cent carry-over, which is an improvement on what they used to do. That is quite recently introduced and it will be interesting to see what effect that has. Two per cent is not as well as you did at the MoD. It does not sound too great but the latest position, as far as I can see, is that they are not using the carry-over. Less than half of that was used last year, so that if I were to go to my colleagues in the Treasury I would be pretty hard-pressed to show they are bursting against the seams. The more significant thing when one looks at the individual research councils, I think personally at the moment, is that the ABRC are holding back particularly large figures of unallocated at the moment as a kind of in-year contingency to give themselves flexibility. I think I am right in saying that for the forthcoming year at the moment there is still 6 per cent.

(Mr Wilkinson) For 1992-93.

(Mr Clarke) Four per cent next year, 6 per cent the year after, unallocated, which they will allocate once they are nearer to it. It is that which enables the Research Councils particularly to say they are declining in real terms because they do not yet know what proportion of the unallocated funds they are going to have so what is formally allocated at the moment is quite markedly down for two of them in real terms. It may remain there if they do not get anything out of the unallocated margin but because there are all these reviews going on the ABRC have kept back a particularly low unallocated margin and I think that is their way of tackling the same problem to make sure that further into the year they can be certain of getting those contingencies without having to under-provide.

Lord Gregson] I think the complexity of forecasting the research expenditure including

complex equipment is probably equivalent to the same problem the MoD had in forecasting the cost of complex equipment likewise. I remember the Commons Select Committee heard that more of it was going via cannon balls and quill pens than buying Challenger tanks at the time. Four per cent might be a much better figure than 2 per cent. Two per cent screws it down in my opinion too low to make it really effective.

Chairman

210. If I could intervene before you respond to that. You are right in saying there is 2 per cent now but I am not sure you are right in saying it is fairly recent.

(Mr Wilkinson) It was introduced on the 1 April 1989.

211. So recent?

(Mr Wilkinson) It is as recent as that.

212. But there was a carry-over allowed to SERC at any rate, 20 years ago when I was its Chairman.

Lord Gregson] Unofficially!

Chairman

213. Absolutely officially.

(Mr Wilkinson) I do not have that degree of historical background, my Lord Chairman, but what I do know is that after a series of discussions with all five Research Councils, the Department and the Treasury, from April 1989 there was introduced a set of arrangements to try and introduce greater flexibility in the funding of the Research Councils and as a result they are now able to carry forward from one financial year to the next of their gross recurrent expenditure.

214. But no deficit. You can carry forward a deficit of 2 per cent?

(Mr Clarke) If they overspend and recover it next year, you mean?

Lord Gregson

215. The whole thing comes from the fact that the bills do not come in as you expect sometimes and you make a mistake one way sometimes and sometimes another way if I understand the system correctly.

(Mr Clarke) You mean underspend up to 2 per cent.

216. Less than 2 per cent you can carry that forward but if you overspend any amount at all you cannot say, "I will pay that next year".

(Mr Wilkinson) That is how I understand it.

(Mr Clarke) You are implying their approval for overspending. In fact, what tends to happen is the general Treasury rule if anybody overspends they do require them to cover it within the next year's budget

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued]

[Lord Gregson *Contd*]

unless they successfully bid for it I do not think any of the Research Councils have in the end recently overspent because that would not only involve planning to allocate but actually allocating more money than they have been provided with and that would cause serious problems with the Treasury, the NAO and everybody else if they started doing that.

217. Costs escalating over the year would do the same thing.

(*Mr Clarke*) I think the Research Councils operate by grant do they not and sometimes they must get the estimates wrong.

218. I must say if you remember the MoD situation it was considerably helped by the claims in the newspapers that the MoD were running round being asked to sign invoices in order to get paid monies they had not already spent. It was quite ridiculous.

(*Mr Clarke*) It is the curse of the public sector generally but if you have no flexibility at all. Other people are delaying bills like crazy, having bought equipment but refusing to pay their suppliers until the next financial year or they are running about trying to get people to order what they do not want but for the following year. I am familiar with the problem. I am in the realm of public service and that is what was addressed with the 2 per cent. As of today I have no evidence that they are having difficulties because they are not using the 2 per cent. They may say that in itself is not conclusive.

219. I think they are frightened to use it, quite frankly, Secretary of State.

(*Mr Clarke*) I am sure we will continue the debate with the Treasury. My instincts are the same as yours and as long as in the end you do not allow people to use it to go constantly up to their contribution, a certain amount of flexibility makes a lot of sense in areas like this.

Lord Dainton] It does enable Research Councils to budget ahead for rather lumpy items of expenditure that may come in a subsequent year but I think they all fear if they underspend in a particular year they will be regarded as not needing the money allocated to them for the following year.

Chairman

220. In our notes you were asked one specific question to do with the research ship JAMES CLARK ROSS and the headquarters building where there seems to be some misunderstanding somewhere or other about whether those two items of capital expenditure had or had not been taken into account in the plans for 1990-91 which makes a difference to what you get the following year. I wonder whether you are able to elucidate that point for us?

(*Mr Clarke*) The view that I take and the Government takes is that we can demonstrate a 6 per cent growth and once you take account of those particular items so if you take these out of account

in the previous year's baseline there is a 6 per cent real terms growth for the recurrent science budget. That is the basis of our argument that there is level funding. Now the counter-argument I know is that you should not take these out of account and that the JAMES CLARK ROSS and the headquarters buildings were in the funding amount for the previous year and so therefore you should measure this year by last year including this and that takes you down to the 3 per cent figure which some people use. I do not accept that. Dealing with them separately, JAMES CLARK ROSS is £18 million more or less worth of ship built for a specific purpose for the Antarctic survey and so far as I am aware it was funded on the basis that it was needed for that survey and it was special help for the survey and we would not have been providing that money if there had not been such a ship to be built and therefore the assumption once we have got the £18 million for the JAMES CLARK ROSS we can assume once we have finished with the ship that is £18 million in our baseline is not a wise assumption to make. The case is even stronger in the case of the headquarters building. I have not been to it yet but that it to build an office block I assume in Swindon to house the administrative costs of the Research Councils and to say that is part of the science budget and is part of the baseline once it is built, from the research project of building our office block which now should be free to go into other research projects of other Councils I do not think is a very strong argument. I was not debating this public spending round last year but it obviously did not come as a strong argument to my colleagues either. They therefore knocked them both off as they are capital expenditure because, as I said, they were one-off expenditures and they were concerned with the underlying science budget for research. I am explaining what I suspect has been the underlying debate going on in quite a lot of the previous evidence before you.

221. I would accept your argument absolutely if it were not for one thing and that is large capital items, buildings and other large things, if they were treated in the same way, namely taken out of the budget for the purposes of comparison in earlier years, then you would be absolutely fair in what you say but if heavy capital items were included in the budget in earlier years and you have taken them out this year you have, so to speak, "pulled a fast one".

(*Mr Clarke*) They were included for some purposes last year. They are large capital items in a science research budget, I agree, of the type the office block is. I think the one for the ship certainly is more akin to the large capital investments you might make in any large research project, the building of a telescope or something. This unique ship was built specially for the Antarctic survey which got special help and would not have gone into the research budget if it were not for providing a research ship, the JAMES CLARK ROSS. They therefore were as far as cost was concerned treated as one off items and the rest was regarded as the science budget. The

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued]

[Chairman Contd]

one thing I would say about what other witnesses have said is they have no basis, I do not think, for arguing they were built into their baselines at all. The reason why you are considering this a crisis, which I admit I replied "What crisis?" but there is a big problem with the Science and Engineering Research Council and the Science and Engineering Research Council may try to argue, or the people who were on it, that the base line has been reduced but they were given specific planning figures. What they did last year was to take a gamble rather than a plan within the planning futures that they had got. They decided to take a flyer on seeing whether they got a further increase next year over and above that which they had been told to plan for. That, with the greatest respect, has proved to be a serious mistake and they are now having to go round getting back the planning figures they got. What I find more impressive is that they are now having a forward look at their commitments and are beginning to have a look at how they can make proper provision or choice of priority within the assumptions they have been given to work within.

222. I have no intention of quarrelling with you on that score but I would only point out that the sufferers in this are not the research councils themselves but those who receive their funds, especially research groups in universities and polytechnics and so on. Just to give one figure as an example, the Science Board of the SERC, which distributes funds to physics departments, chemistry departments, biology departments, maths departments and so on, has had its annual expected budget cut from about £45 million, which it has been over the last few years or thereabouts, to £24 million for this year. That is roughly what I believe the position is. That is a swingeing cut which has happened as a result of whatever it was that gave rise to this difficulty in the SERC.

(Mr Clarke) If it arose from over-commitment, yes, I would argue that would otherwise not have happened. I agree that is all very regrettable to say the least and it shows how they would have been much better to face up to choices last year rather than take a chance that it would come right. In so far as what they are doing now—because they have so many in-built things that are not adjustable—involves them cutting back on the small grants, I think that is unfortunate as well. That is a great pity. The more encouraging thing is that Sir Mark Richmond and his colleagues are taking a forward look and some of the cries that are coming up, because they have taken a forward look and are looking at some of their bigger facilities, are, "We have to cut something in this department," to give themselves more flexibility in future.

223. Am I wrong in thinking that the ABRC did not expect you to treat these two items in the way that you did?

(Mr Clarke) I do not know. I am not sure what they expected. I should have thought it is quite clear that given the choice they would have preferred that

we had not because to build another—I forget what the two together are—about £20 million into your baseline as a permanent year-by-year increase on what was originally the cost of the Antarctic Survey and the office block would have been a great advantage to them, but they were not able to plan on the basis that they would not be.

224. Sir David Phillips in his evidence to us when he came to see us indicated to us that he was somewhat taken by surprise, as I understood his evidence, by the way these two items were treated.

(Mr Clarke) I am sure he would rather they had not been but I imagine if he was taken by surprise, perhaps he had been hoping the baseline would be calculated in another way, but I have said already I think that is a matter of argument. They would, wouldn't they? They would, given the choice, say they would prefer to have had these two built into their baseline, but I do not think anybody was told to anticipate that and I would say what has happened has been wholly predictable given last year's public expenditure survey, that the agreement was not to carry on these one-off items and turn them into recurrent research grant.

Lord Porter of Luddenham

225. Secretary of State, you have resisted the use of the word "crisis", which I know you like, but that was across the board. Would you not agree that the figures we have just been talking about, the 50 per cent cut in one year in the Science Board, which is the money that goes to all the young people applying for grants in all 50 universities, surely does lead to crisis? These people had been expecting more and, of course, it is because of this multiplier that there is so much inflexibility in the rest of the budget that we have been talking about, but your 2 per cent has escalated to 50 per cent when it comes down to the grants and does lead, in my opinion and in the opinion of many others, to a real crisis. So you frighten me certainly with your talk of the GDP deflator going from 6 to 7 per cent. That is only 1 per cent but 1 per cent of £980 million is 9.8 million and that is the sort of figure we are talking about that is going to cut the grants by another 50 per cent, so I think that is a crisis.

(Mr Clarke) In the narrower part of the Budget, yes, I think it is quite serious that they have to cut back on their grants. I think it is extremely undesirable and it underlines the need, firstly, for the SERC not to repeat this exercise of over-committing themselves but also to have a look at some of their fixed commitments, because I am sure nobody in the SERC really thinks it is a good thing to cut back by 50 per cent in that particular area, but what they find is it is the only one that is readily adjustable to that extent.

226. But as the Chairman has pointed out, the people who suffer are the ones who cannot afford 1 per cent?

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued

[Lord Porter of Luddenham *Contd*]

(*Mr Clarke*) The majority of research workers, I agree.

227. And if it is a crisis it is an immediate one and one wonders where there is any way round it in the very short term?

(*Mr Clarke*) I fear not. My own opinion is that it would not have happened if the SERC last year had taken the planning figures they got allocated on that basis and faced up to what they did not face up to then, which was what they were going to stop funding to get within the planning totals. They produced this figure of £40 million which they are lacking. I must admit I have never totally been able to follow the maths in that. We have been going over our maths. I have never quite understood how this figure of £40 million is arrived at but a large part of it appears to be planned commitments for which they have not actually got resources or been given any planned allocation, and I imagine they shied away from doing last year some of the things they are now looking at in the course of their survey this year and they have got themselves stuck into some problems which are not immediately flexible. They are looking at Daresbury, which is very controversial, and talking about closing that in 1993. Of course, that does not help them now, hence the 50 per cent cut in the small grants. But in terms of being in any doubt about it, I have to say I think the prospect of any planned programme of this kind being expanded so rapidly because people had simply failed to plan within their allocation last year is about the least promising in-year bid I can think of and it is very difficult this year when we know the research councils have been doing the most frightful lobbying, going round trying to decide who they are going to cut out, and it is extremely tempting to duck out and let the temperature build up a bit in the hope that the Government will do something more. That is what they did last year and if you gave them more money this year there is a certain fear that Sir Mark and his colleagues would mark a bit of time on some of the difficult decisions they are now facing up to.

228. But who is ultimately responsible for righting the wrongs done by the SERC, its Chairman, its Board or anyone else, when it is the customer, who has certainly not perpetrated the wrong, who is suffering? They are responsible to whom?

(*Mr Clarke*) They are responsible to me and the Government's responsibility is to provide the science budget and to put in place effective mechanisms for distributing it and avoiding these kinds of planning errors. What happens when you get part of the system which has not followed proper budgetary controls is that Government usually then makes in-year provision to cover for that. The SERC were challenged last year when their plan showed that they were planning to go over their planning totals and they said if necessary they could live within what they put forward, but as we now see, they could if necessary, but it involves making these sorts of dramatic cuts in a rather important part of their

budget. I do not think we can bail them out. If you bail them out the next thing you find is that some of the other councils start doing the same thing. They think, Science and Engineering is doing rather well compared with Medical and Environmental because it keeps getting bailed out because they are making enough noise. That would be my fear.

Lord Gregson

229. Secretary of State, the people who are being cut out are mostly young scientists who are coming into the system for the first time and they are being hit the worst and this to me is a disaster. Does it not seem to be a case for having a look at the contingency.

(*Mr Clarke*) For the reasons that I have given I do not think there is any sort of prospect of anything coming out of the contingency reserves. It would be underwriting a failure to plan last year. I hope that the SERC is acutely aware, as we are, that this is undesirable to make these drastic cuts in these grants to the younger scientists. I hope the people lobbying, who are perfectly entitled to lobby, but the people asking for the review that SERC are now carrying on, also bear in mind that if SERC does not carve out some sensible flexibility for itself and decide what it is not going to fund, they are going to be constantly using these grants to regulate and they must get on to some sensible flexibility.

230. The people who lobby are not the people coming into the system in the first place, who are the people who are going to lose out. They are not lobbying?

(*Mr Clarke*) I think they are a weaker lobby than some of the big projects. Collectively they make less public fuss. They try but they do not make the same public fuss as, say, the Daresbury laboratory or the postponing of astronomy projects or whatever it may be but I am all in favour of SERC making their scientific decisions about what they are going to close or postpone in order to get back to a decent level of grant for our younger scientists.

Chairman] That is perhaps why we are making the fuss about it.

Lord Butterworth

231. I suppose this raises the question you yourself raised earlier, does it not, about priorities in science. Are you actually satisfied that the Research Councils have got sufficient expertise in the management of priorities?

(*Mr Clarke*) Yes, I am. Firstly I have absolutely no say and it is not for the Secretary of State to second guess the advice of the Research Councils. This particular Secretary of State is entirely out of his depth in making scientific judgments about relative priorities in the fields that we are talking about and unless there is some totally compelling reason, the advice we get from the Research Councils must determine the scientific priorities. I have every confidence in the scientific experience of

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued

[Lord Butterworth *Contd*]

the people we are talking about. I knew some of the people previously on the SERC and as scientists I do not think their reputation was seriously in doubt but this needs to be combined with—we have to put a bit of pressure on Research Councils in combining their scientific expertise in putting their judgments into practice in controlling money. Last year's was a wholly unscientific exercise in hoping more would turn up next year.

232. I gather from what you have said that you quite rightly would condemn what had happened in SERC. I am sure that many of us would feel as far as we have seen the evidence, something went desperately wrong there but it is more than unfortunate, is it not, if one year's young people—and it may be more—be they young researchers or students, have to suffer because of this. I thought a bit earlier you referred to some rather larger contingency being held by the ABRC. Whilst I would not wish to excuse what happened in the SERC, is this not a special cause for that contingency to be brought into place so that these young people shall be given the chance which you know in all conscience they thought they were going to have?

(*Mr Clarke*) That is a matter for the ABRC. Firstly, as I say, I should not, unless something totally unpredictable occurred, dream of seeking to second guess their scientific choices. They are holding back the 4 per cent next year, 6 per cent after that and I think they are going to start allocating some of it soon. You have had Sir David Phillips before you. I do not know whether you have put that to him. By and large I am waiting for his advice of what he wants to use the 4 per cent for and even though I am being sympathetic to all these arguments you are putting forward about young scientists, it is only fair for me to reserve my position until he comes along and says, "It's all very well that you may feel and their Lordships may feel that but this is a higher priority." Mr Wilkinson may have more idea of the money that Sir David Phillips is holding back and what he is currently using it for.

(*Mr Wilkinson*) I want to clarify the years we are talking about now. Lord Porter's figures of SERC budgeting, the year in which they are expecting to cut from the new research grants by 50 per cent, is 1991-92. The flexibility margin that the ABRC still holds is for the financial year 1992-93. So the funds for 1991-92 are already fully committed.

Lord Gregson

233. Her Majesty's Treasury still has a contingency does it not?

(*Mr Clarke*) That is what I was saying. I really do not think it would be proper to raid it in order to get the SERC out of its immediate difficulty though we heard the argument about the difficulty of taking that stringent view. The SERC is embarrassed but it is the young researchers that are being affected. I do appreciate that but the difficulty always with cash-limited programmes is once you start seeing the

cash limits as not within your own province nobody stays within them. Everybody thinks that if you get into a big enough mess, you will be bailed out.

Chairman

234. We should not be attempting to negotiate with the Secretary of State this afternoon. We have sounded him out on his attitude and that is fair enough but I do not think going any further is right.

235. Can I ask one technical question and then I would like to ask Lord Dainton to come in and talk about dual funding. The technical question is to do with overseas costs. It is perfectly reasonable to say that the European expenditures of the Research Councils can just be allowed to run because we are all part of the ERM nowadays and that is swept up in that. However it is the other SERC foreign expenditures that I am not so sure about, those which are in Swiss Francs or US dollars and they are, of course, outside the ERM and so something has to be done by somebody to take into account the fluctuations that take place in these currencies and we have been wondering whether it would be reasonable to expect the Research Councils to cope with a fluctuation within a 2.5 per cent band, but in Swiss Francs and dollars and other things which are outside the ERM to be helped with fluctuations outside those limits. It did not seem so unreasonable to us and I wondered whether you had any comment about that?

(*Mr Clarke*) Again I do not think that the Treasury would agree to allow our cash-limited reserves to take account of wild fluctuations in the currency market although in the past currency movements have caused considerable problems, at the moment I think currency movements are not causing a problem. Joining the ERM has not only led to—but I firmly believe will continue—stability with the rest of the EC but there is really considerable stability with the Swiss franc as well.

236. That was because the dollar balanced out the Swiss France, as I understand it.

(*Mr Clarke*) The weakness of the dollar is continuing to be a problem but I do not think and I am not aware of any programme within the Foreign Office's own programmes where allowances are made with in-built guarantees against currency fluctuations. It does cause more serious problems in other parts of the Government than this, I think. It is something that we have to keep an eye on in this area because I think increasingly we are going to be in a lot of international science and paying subscriptions. We all get up tight about these international subscriptions but they are all subscriptions that the science community is willing to pay and they are on the whole worthwhile. We have sorted out some of the CERN problems that were dominant a few years ago and I do not think we are going to alter the rules in the near future but we hope that the currency situation—

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued

[Chairman Contd]

237. It would help to have some rules of thumb for them which, as you say, are on the increase.

(Mr Clarke) I do not think that they are on the increase. I think they were worse three or four years ago when the currency fluctuations were wilder. Currencies have been stable in the last few months. The CERN subscription has gone down and we pay on a cash basis and we are suffering less pressure on currency fluctuations now than we were three or four years ago.

Lord Gregson

238. Forward cover could be allowed. Does the Treasury allow forward cover to be taken?

(Mr Clarke) Obviously the Treasury considers the results of over-dealing in these markets but I do not think they allow individual programmes to.

(Mr Wilkinson) They do actually in this case and they have agreed. What has happened on the science subscription, which is the greatest international subscription—£53 million this year—is that recent changes at CERN mean contributions are now calculated and adjusted each year rather than every three years and the calculations are made in up-to-date exchange rates, so that the CERN Secretariat works out what each country must contribute at up-to-date exchange rates and there is provision for the SERC to be buying at the same time as those calculations are made. This is why, as the Secretary of State has explained, although this has been a problem it has smoothed out over recent years and is not such a problem now.

Chairman

239. But that means if the GDP goes up our subscription to CERN goes up but the Secretary of State does not anyway agree that the science budget should be tied to the GDP?

(Mr Clarke) The GDP is the main reason why there has been an increase in our CERN subscription in the last couple of years but I do not think it is enormous or terribly significant, that modest increase, compared with the average CERN project which it certainly used to be. In cash terms our subscription to CERN is still as low as it was four or five years ago.

Chairman] Could we turn to dual funding. Lord Dainton?

Lord Dainton

240. Secretary of State, you did say at the beginning that there was a prospect of a redrawing of the demarcation line between the UFC and the ABRC and the prospect of a transfer of funds, £50 million in one year and £100 million in another. We have received a great deal of evidence on this and when we pursued the questioning it was very difficult for us to see what advantages there were in transferring a tranche of money from one organisation to another when the money would then

be put back into the pensioners (if I can put it that way) of the first organisation to do what they were already doing with it. Do I make myself clear?

(Mr Clarke) Yes.

241. It seemed to me a circulation of money without purpose. We also found that not only that but the Chief Executive of the Universities Funding Council himself could see no reason for it and the universities, when they gave evidence through the CVCP, were also opposed to it and saw very considerable difficulties in its proper implementation. To add to that, of course, the Chairman of the ABRC and Sir Mark Richmond said they would want to see some kind of ring-fencing about that money when it went back into the universities as an attachment to the direct costs of the grants of some indirect costs, and there were a whole range of problems associated with it. So I think the Committee would like to know what advantages are seen to accrue from it which are not already there?

(Mr Clarke) The purpose of grants is to get greater clarity, which you and I are seeking, and I agree that clarity is rather difficult. It does seem to me nobody was clear before where the dividing line lay with these rules. The university was expected to provide a well-founded laboratory with the research councils providing the grants on top and this is a fresh attempt to draw a clear boundary between the two and it is supported by people who I might describe as being on the research side of the fence, who were never quite sure what their research contributions from the councils were going to be or where they were supposed to go. Unfortunately—because I entirely agree with Lord Dainton—that instant clarity is not available under the new arrangements. They are all still working on it and we do not propose to introduce it until 1993. I think I am correct in saying the UFC and the research councils and the CVCP are still working on the details of the transfer but my understanding is that the idea is to take away some of the vagueness, to make universities responsible for the staff costs and the premises costs but to make everything else, all the other costs of projects, the subject of a specific grant from the research councils, and there is a direct transfer as a result which should not affect the overall funding for research because it is taken from one pocket allocated to the UFC and put into another allocated for the same research to the research councils. We hope they will come up with a system which will lead to absolute clarity and not the criticisms there were in the past about the vagueness of the previous system.

242. One of the difficulties, of course, is it is financially neutral over the dual support system overall. One can see that there is no more money. There is just a change in the system of allocation. But the actual real costs of an indirect character vary enormously from grant to grant and this is where disparities may occur if there is a fixed ratio of the

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued]

[Lord Dainton Contd]

direct cost chosen as the sum which is to be transferred with the grant, and we understood that was likely. Is that the case?

(Mr Clarke) They have not come back to us saying that.

(Mr Wilkinson) There are two studies going on. The first one is to establish a clearer boundary line. The difficulty at the moment, as the Secretary of State has just said, is the blurred nature of the boundary as to who should pay for what.

243. Could I interrupt. If you do not know where the boundary line is, why do you move it at all?

(Mr Wilkinson) In a word, for greater accountability. To go back to your original question, I think that this proposal, which actually emanated from the research community rather than from Government and on which the Government have consulted widely, is that there should be a greater understanding of the costs of research so that management in the university institutions understand what they are committing themselves to when they accept a research project within that institution. At the moment resources are being deployed without any real or true understanding of the costs involved and that can obviously lead to the misallocation of resources that comes from this blurred division of responsibilities that we currently have. So the basic answer is that we are trying to sharpen up the accountability for the funds being spent but, as the Secretary of State has just said, we do actually want to get this right and two studies are taking place. The first, involving the research councils with the CVCP, is looking at the boundary, what should fall to whom for the direct costs, and the Committee of Vice Chancellors and Principals are then looking at those costs which cannot be directly assigned to a single project or where it would be excessively bureaucratic in accountancy terms to assign them, to assign the departmental and central costs that should be added on, as it were, as an overhead. The results of those studies are expected to arrive with the Secretary of State next month and we are hoping that these will put us in a position to answer the questions that you are now putting to us.

244. Will this study—it is not made clear to us—be subject-sensitive? There is all the difference in the world between the Economic and Social Research Council funds in terms of their indirect costs and, shall we say SERC.

(Mr Wilkinson) We have invited the people conducting the study on the indirect costs to say whether or not it should be general across subjects or whether there are sensible divisions between subjects, so that question will be addressed in the study.

245. If I can pursue this a little further, because it does affect the universities very critically, will this money then have to be spent for the purposes of that

particular grant to which it is added as an indirect cost or will the universities have any degree of flexibility over it in its allocation?

(Mr Wilkinson) The allocation to the universities from the research councils will mean that the universities know exactly what they are getting the money for. The universities will, of course, remain autonomous bodies and will have to consider the allocation of those resources. It will not, as I understand it, lead to direct earmarking.

246. So one comes back to the problem we began with in a sense. It would be possible for universities perhaps in a particular research field where the indirect costs enable them, together with their other funds, to use it in the furtherance of that research in general in that particular field?

(Mr Wilkinson) This would be a matter that the Department would want to monitor because the purpose of the exercise obviously is to provide a better fit but without transgressing too greatly on the proper autonomy of university management. Exactly how that monitoring and policing would be undertaken I think it is too early to say.

247. Could I go back to the original point. I understand what you have said and I am most grateful for what you have said but given the uncertainties, do not think it would have been wiser to wait until you had this information before you decided if the tranche of money was to be transferred.

(Mr Wilkinson) The original proposal, I believe, was made in May 1987 and has been debated since that time.

248. Was that proposal made by the scientific community?

(Mr Wilkinson) The proposal emerged in strategy advice from the ABRC and the Department consulted on this and there was not universal agreement with the proposal but the general consensus was that this would improve accountability and the understanding of research costs and the Government decided to proceed but it did say on the basis of wide consultation and the studies now taking place are in direct response to that consultation and the difficult issue of, as you say, moving from a blurred difficult boundary to a clear one has raised all of these difficult problems which are now being addressed.

(Mr Clarke) We have put back implementation once to allow for all this. It should have come in the summer of this year and we have put it back to late next year.

249. The one point I wanted to make was that it was represented to us by the universities—and you can understand it easily because of the problem with SERC—namely that the universities have a good deal of money that they spend on research and a good deal of money that is committed to teaching. A loss of any degree of freedom there means that they are not able to do that which is absolutely necessary

20 March 1991]

RT HON KENNETH CLARKE, QC, MP,
MR D WILKINSON and MR N SANDERS

[Continued

[Lord Dainton *Contd*]

for the future which is to support those young researchers who have good ideas and are not yet of the status that can qualify for grants from Research Councils and have traditionally been nurtured by the universities themselves. There is a danger that things could be very serious.

(*Mr Clarke*) I note that as advice. That is what is causing all this delay in what was originally, I think, a fairly clear cut provision that the grant should be for particular projects and one should see where it is going. The argument that Lord Dainton is putting is exactly that which the universities are putting at the moment. We hope these studies are going to come up with some promise so long as it does not go back to the same blurring of the lines. The position was blurred and the behaviour of different universities was quite different. Some expected basic equipment to be provided by the Research Councils and sometimes the other way round, they were asking for quite large items to be provided by the university. More clarity is agreed upon but the warnings of Lord Dainton are taken on board because they have been given by other people in the science world.

Lord Dainton] As a consequence of this, there is another point that I want to make. There used to be between the ABRC and the UFC a degree of cross-representation which was very helpful in discussing these matters but that is something that has gone. It was something highly regarded by the Chairman of the UFC in his evidence—although I think Sir David Phillips seemed to be neutral about it and had no strong views—but the universities felt it. Is there a case for strengthening the communications between those two bodies which deal with the same subject?

Chairman

250. There is no cross-representation, in other words.

(*Mr Clarke*) I think there is cross-representation. Sir Peter Swinnerton-Dyer is an example of

cross-representations. He is about to retire but I do not think he is the only one. I am open to correction on that.

251. Forgive me, Secretary of State, he told us quite categorically that he was kicked off by his own Chairman.

(*Mr Clarke*) That is very surprising. You obviously know the UFC well! He was kicked off as a specific representative but there is nothing to stop them attending. We will have a look at cross-membership but there is some cross-membership.

(*Mr Wilkinson*) There is some cross-membership in the form of Sir Charles Rees who is a member of both bodies and a member of ABRC and one of the Secretary of State's officials, Mr Vereker, is also a member of both bodies but in general we have been encouraging working relations on specific issues between not only the ABRC but all five of the Research Councils and direct with the UFC, not only its council but its secretariat, because obviously there are various matters which can be sensibly discussed and taken forward at that working level and as far as we know that is taking place and the studies that we have just mentioned are an example of the two sides of the dual support system, talking together, working together and trying to work out their own problems together.

252. But there is obviously a considerable body of opinion represented to us on the desirability that at least the Chief Executive of the UFC is of right a member of the ABRC. I think that was the point.

(*Mr Clarke*) Changes of personality may lead to that whole question being reviewed but I would like to leave it in the first place to the ABRC and the UFC themselves to consider it.

Chairman] Secretary of State, you have been extremely patient. Thank you very much indeed. You have been most helpful, and your colleagues, too.

Written Evidence from the Agricultural and Food Research Council

1. The Agricultural and Food Research Council (AFRC) provides the UK with an internationally competitive research and training base in all sciences underpinning agriculture and food; including non-medical biological sciences, biotechnology and engineering. The Council's research and training is carried out in its own institutes and through research grants, studentships and fellowships in UK Higher Education Institutions (HEI).

Available resources

2. The Council's grant-in-aid from the DES Science Budget for 1990-91 and the three subsequent years is:

	<i>£million</i>			
	1990-91	1991-92	1992-93	1993-94
	85.9	92.6	89.9	90.9

The grant for 1991-92 and the planning figures for the two subsequent years are the latest available and take account of increases announced by the Secretary of State on 24 January 1991.

*20 March 1991]**[Continued]*

3. The Council also receives substantial research commissions from the Ministry of Agriculture, Fisheries and Food (MAFF). For 1991-92 the Ministry intends to provide £33.6 million for this work. In addition, Council and its institutes expect to receive grants and contracts from industry, trusts, foundations, the European Community and others amounting to £19 million in 1991-92.

4. Figure 1 shows the trends in these main components of AFRC income since 1980, both on a cash basis and in terms of 1990-91 prices using GDP deflators. The main feature is a progressive decline in the volume of MAFF commissions, partly offset by an increase in grants and contract income from other sources (External income). Science Budget funding has held up rather better against the GDP deflator, but the present peak is largely a reflection of special additions for restructuring costs.

5. Calculations using GDP deflators do not however reflect the real erosion in the science that can be bought. The combination of features outlined above has led to a reduction in the number of AFRC employees from 5,700 to 3,700, between 1 April 1980 and 31 March 1991, one half of whom were scientists. Moreover, during the period 1 April 1991 to 31 March 1992 a further 200 permanent posts (as a minimum) will be lost as the result of the continuing restructuring of AFRC institutes; this figure could well increase if underfunding continues.

6. For the period beyond 1991-92 the Council expects to submit competitive bids for Science Budget funds currently unallocated and for any additions to the Science Budget following annual reviews of Government spending plans. Nevertheless, plans for scientific and other related requirements are having to be drawn up against a background of declining planning figures. This undermines the efficiency of the planning process, causes frictional costs and saps the confidence of the Council's research community. A greater degree of stability and certainty is urgently needed.

IMPACT OF 1991 SCIENCE BUDGET ALLOCATIONS

7. The biological sciences are burgeoning. New areas of understanding are being opened up by advances in molecular and genetic studies. Biology is challenging electronics as the engine of industrial growth and wealth creation. Major scientific opportunities abound, significantly outstripping the AFRC's ability to redeploy funds from within its baseline from programmes and projects that have been satisfactorily completed or are producing scientific dividends on a declining scale.

8. Following the Secretary of State's announcement in January AFRC will receive an increase of £1.9M, or 2 per cent of the Council's total Science Budget funding, over previous planning figures for 1991-92. This is a deeply disappointing outcome when viewed against the quality and scale of the Council's scientific plans. It will inevitably leave important areas of the Council's science underfunded.

9. For 1991-92 the Council estimated that £7M would be made available from its baseline for redeployment. However, because of the need to make adjustments for the under-indexation of inflation costs in 1990-91 and 1991-92, consequential redundancy costs and increased superannuation costs the financial plan had to be revised. Not only the £7M released from the baseline but also more than half the additional allocation of £1.9M will be needed to maintain the reduced volume of priority programmes in the baseline.

10. The balance of new Science Budget cash will be used to boost work in the scientifically exciting area of stem cell biology where the AFRC currently has an international lead. The programme has enormous potential in both scientific and commercial terms, with the introduction of disease resistance to early embryos of farm animals a particular target. Funds available are insufficient to press home the UK's advantage in this area.

11. Other important activities will remain underfunded and timely scientific opportunities will be lost to British scientists. An example is the Council's planned increase in its annual spending on biological responses to global environmental change of £3.5 million in 1991-92 rising to £5.5 million in 1993-94. An understanding of the interaction of plants, animals and micro-organisms with their environment and their relationship with the physical processes in the atmosphere and oceans is essential if predictions of changes such as global warming and their impacts are to be made more precise. This programme remains a high priority in Council's latest scientific plans.

12. Other components of Council's expenditure in 1991-92 face cuts compared with earlier plans. The provision of replacement and new equipment for the seven AFRC research institutes will be reduced to a total of £2.3 million, which is half the planned level and equivalent to only 3 per cent of the institutes' recurrent budgets. This is a dangerously low level of provision for programmes which increasingly depend on sophisticated instrumentation and data processing equipment. It cannot be kept at this low level for more than one year without severely damaging the international competitiveness of the AFRC institute base. Moreover, the amount of capital for building work is inadequate, even to carry out non-scientific projects necessary to meet statutory regulations.

*20 March 1991]**[Continued*

13. The Council had been planning a substantial increase in its funding of HEI research and training in 1991-92 compared with 1990-91. But as a consequence of the Secretary of State's allocation this has been reduced somewhat and will only be £19.5 million out of a total DES Science Budget of £89.6 million. As much of the planned spending is committed to existing grants and training awards, there will be a disproportionate decrease in the numbers of new grants, probably by about 20 per cent. This is at a time when demand from HEIs has increased dramatically over the past 24 months (355 research grant applications worth £21 million in 1986-87; 863 applications worth £83 million in 1989-90). Consequently the success rate for alpha rated applications has fallen from around 70 per cent to 40 per cent in 1990-91 and on present plans is unlikely to exceed 35 per cent in 1991-92.

14. On present planning figures overall prospects for 1992-93 give little encouragement. Much will depend on AFRC winning a substantial share of £39 million unallocated Science Budget and on the rate of cost inflation. AFRC's provisional allocations for its institutes allow a 5 per cent increase for Science Budget programmes but only 2.5 per cent for research commissioned by MAFF. Higher rates of inflation will almost certainly lead to post losses including redundancies. Above 6 per cent it is estimated that each 1 per cent increase in inflation will cost an additional £750,000 on staff restructuring.

20 March 1991]

[Continued

Figure 1

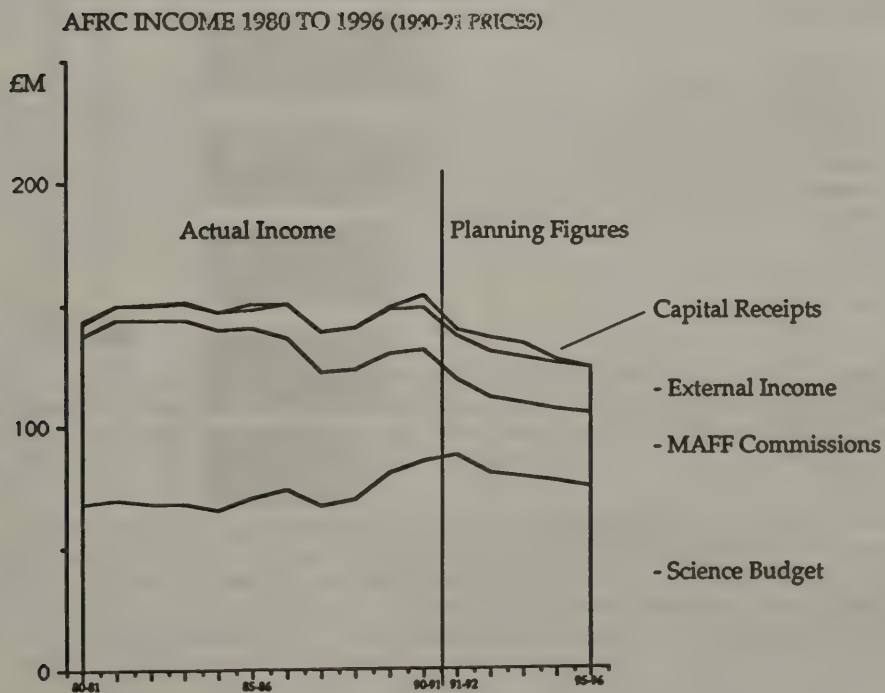
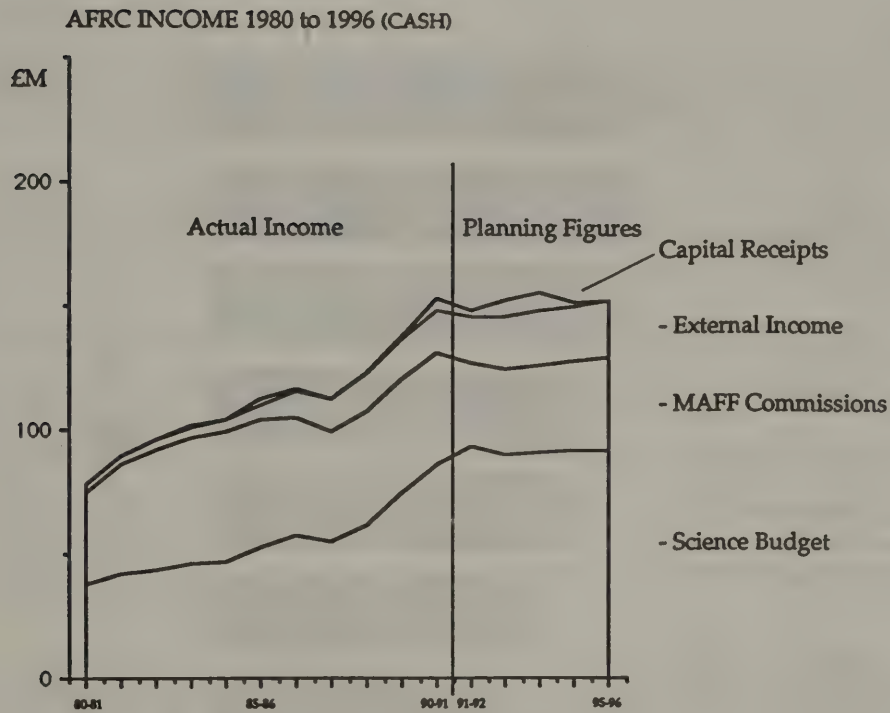
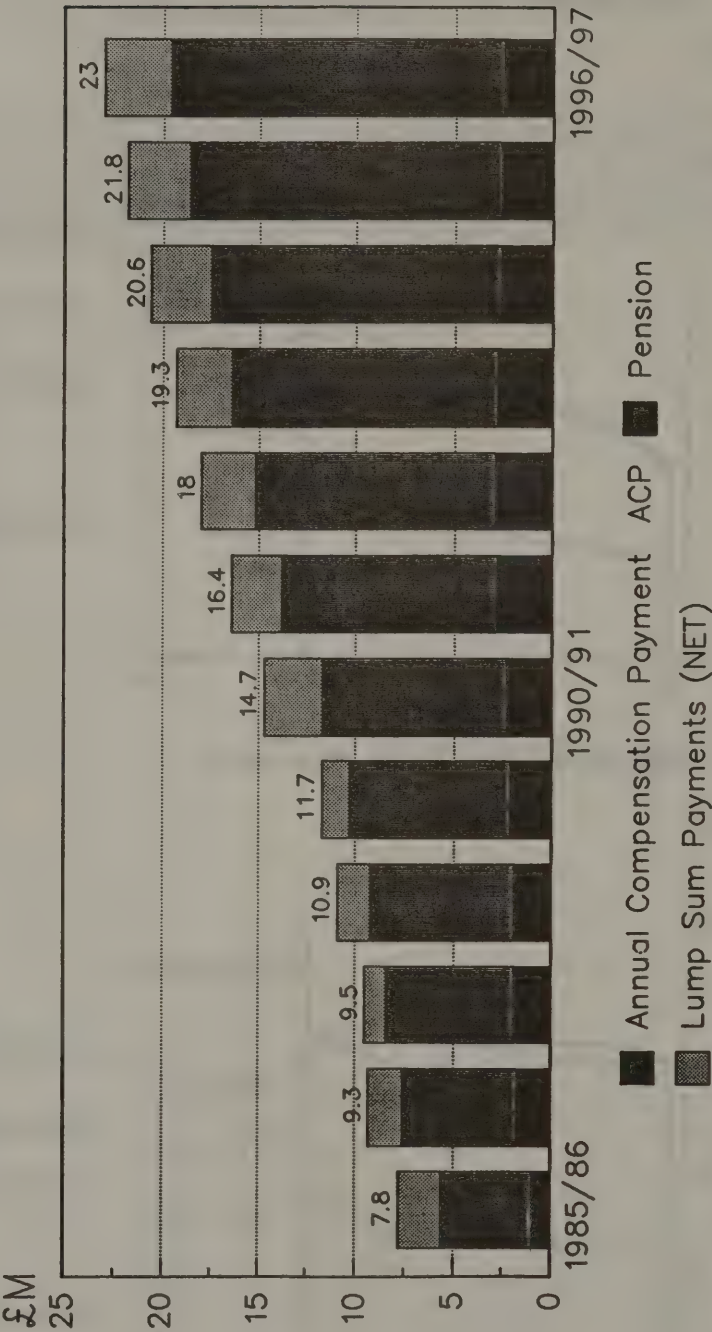


Figure 2

SUPERANNUATION EXPENDITURE
1985/86 - 1996/97 - CASH TERMS (NET)



Figures for 1991/92 onwards are estimated.

20 March 1991]

[Continued]

15. In the HEI sector AFRC notes with considerable concern that the AUT has submitted a claim for a 16 per cent pay rise for academic and related staff. If agreed without full additional Treasury funding for staff supported by research councils, such pay rises would greatly exceed the Council's ability to revalue existing awards and maintain the planned level of new awards in 1991-92 and subsequent years.

SUPERANNUATION

16. In addition to the decline in the real value of the AFRC Science Budget baseline, the Council's superannuation costs are rising sharply. As a proportion of the Council's *total* income/superannuation will have risen from 7.5 per cent in 1985-86 to an estimated 15.0 per cent in 1996-97. This trend is illustrated in Figure 2.

17. The AFRC Superannuation Scheme is a non-funded scheme analogous to the Principal Civil Service Pension Scheme. However, unlike Government departments whose superannuation costs are met from a separate Vote, AFRC's costs, which are legally binding, are a first charge on the Council's income.

18. The principal reasons why superannuation costs are rising faster than income are:

- (i) A rise in the pensioner population from 2,200 in 1986-87 to 3,250 in 1990-91 and an estimated 3,700 by 1996-97.
- (ii) Greater portability of pension rights causing more outward than inward pension transfer values.
- (iii) Annual pensions increases in line with the Retail Price Index. The increase of 10.9 per cent from April 1991 underlines how pension costs grow faster than AFRC's total income; and
- (iv) The large reduction in MAFF commissioned work means that the fixed percentage of contributions for superannuation cannot cover the cost of pensions arising from the previous higher levels of commissioning.

19. In 1985 the House of Commons Education, Science and Arts Committee recommended "**that the superannuation costs of the Research Councils should be funded as a separate item on the DES Vote, and should not be met from the Science Budget**". The Government response in July 1986 (Cmnd 9849) rejected the specific recommendation but stated that these costs should continue to receive attention within the context of the Science Budget and through the mechanism of the ABRC's advice to the Secretary of State.

20. Obligatory and increasing expenditure on superannuation is progressively restricting Council's ability to fund high priority science programmes and capital projects. Already 11 per cent of Council's total income is pre-empted this way; by 1996-97 it will be 15.0 per cent. The AFRC believes that the Government should now give fresh consideration to these arrangements as they are increasing non-scientific expenditure from the Science Budget and thereby appear to be frustrating the realisation of the Government's policy for civil R and D.

DUAL SUPPORT

21. AFRC welcomes the proposed changes in the dual support system as a means of targetting research funding more effectively on productive and competitive academic staff. The transfer may also lead to greater transparency on how remaining UFC funds are distributed between teaching, seedcorn research and research supported by the research councils and other agencies.

22. The research councils and universities are currently examining the detailed implications of the transfer; in particular how direct costs and overheads are to be identified, appraised by research councils and accounted for by universities. Harmonised procedures will be sought without losing sight of the objective of clarifying the real costs of projects supported by the research councils. It may be that the detailed studies underway will demonstrate that the funds the Secretary of State is currently planning to transfer to the research councils (£1,000 million per annum) are inadequate.

23. It is for consideration whether a similar transfer should be made in respect of the support costs of postgraduate students receiving research council training awards. Currently most of these support costs, which can amount to £6,000 per annum, are met by UFC funds to universities. Only a nominal Research Training Support Grant (RTSG) of £400 per annum is paid by the research councils. Transfer of full responsibility, with the necessary funds, to the research councils would again improve targetting and increase transparency of the system.

20 March 1991]

[Continued

THE EC SYSTEM OF RESEARCH FUNDING

24. Research grants from the European Community are posing a particular problem which will be exacerbated if funding from the Third Framework Programme expands. The non-recovery of full costs of R&D from the EC and the present dual support system for scientific research in higher education combine to distort the market in which research council institutes and HEIs compete for EC funding.

CONCLUSION

25. All the funds released within the AFRC's Science Budget baseline for 1991-92 have been used to meet the consequences of higher than expected inflation in 1990 (especially salaries), superannuation costs (pensions rising by 10.9 per cent) and staff restructuring. None of the Council's planned new scientific programmes can be started from funds within its baseline. Against that background the £1.9 million addition announced by the Secretary of State does no more than limit the damage from rising costs and is therefore a serious setback. A modest start will be possible for the highest priority programme in stem cell biology. But major expansion of other important new programmes such as biological responses to global environmental change have had to be deferred. New research grants for HEIs will be cut by about 20 per cent from previous plans and equipment provision for AFRC institutes will be forced down to a dangerously low level. To restore the capacity available in 1989-90 for exploiting exciting and timely scientific opportunities and to restore confidence in its UK research community, AFRC will be bidding strongly for a large share of the £39 million unallocated Science Budget funds for 1992-93. The Council will also be pressing through ABRC for a generous Science Budget settlement in the Government's 1992-93 spending plans to take forward existing new scientific priorities, and the resolution of the issue of superannuation payments, a particular problem for AFRC, which reduces significantly the proportion of the Council's funds that are available for science.

*Agriculture and Food Research Council
25 February 1991*

Written evidence from the Committee of Directors of Polytechnics to the House of Lords Select Committee on Science and Technology

The Committee of Directors of Polytechnics welcomes the Select Committee's investigation as a timely exploration of an important subject. The CDP's observations follow the sequence and numbering of the questions listed in the Press Notice of 12 February 1991.

The answer to the main question which the Committee is addressing viz. the truth or otherwise of Mr Kenneth Clarke's statement that the science budget for 1991-92 provides the basis for the continuing development of the country's science base, may depend critically on what efficiency gains are realisable. It would be insufficient for the Committee to consider only the £982m given to the five Research Councils and the accountability and efficiency with which they discharge their responsibilities. The Committee must also consider the £850m given to the Universities Funding Council for the same purpose (the Dual Support System). The CDP's view is that, by and large, the Research Council money is at least accountable and clearly spent on research. The almost equal sum given to the UFC is not accountable in the same way and it is unclear whether it is spent on research or not. It may therefore be that if the deployment of this other half of the science budget is addressed, efficiency gains could be realised, thus making the Secretary of State's statement true.

RESEARCH COUNCIL FUNDING

- 1(i) In part the current financial difficulties of the Research Councils arise because of an obsessive concern with concentration that has dominated much of Research Council policy, especially that of the Science and Engineering Research Council. Obviously for undertakings with enormously expensive equipment, there has to be concentration at European or national level, but there are some unhappy instances. The provision of neutron facilities (SERC) would seem to have been excessive. The cost to the nation of concentrating clinical research at the Northwick Park Centre (MRC) and then of deciding to disperse it, must have been enormous. It is unclear whether in the case of some of the interdisciplinary research centres the nation will obtain more benefit than would have been obtained by dispersing the money more widely through responsive mode funding. One result of the Research Councils' approach to concentration has been a denuding of responsive mode funding to the detriment of the science base.
- 1(ii) The presupposition in this question is that the Committee has to accept that all research salaries are linked, inevitably, to academic salaries and terms and conditions of service. This creates great inflexibility. It is suggested the Committee might give attention to the question of whether such linkage of research and teaching salaries and conditions is in the best interest of the science base. The government in the view of the CDP cannot be held responsible for continuing this inflexible system.

*20 March 1991]**[Continued]*

- 1(iii) Undoubtedly the increased subscriptions to international projects has caused problems. Cost control and efficiency in large scale international projects would seem to be a continuing difficulty. The United Kingdom's stand on the funding of science demonstrated that efficiency savings could be made and there is a strong case for further efficiency reviews.
- 1(iv) The failure, or otherwise, of budgetary increases to keep pace with inflation, should be judged over a longer period of time than one year. Obviously a government has to handle the economy as a whole and a science budget must be part of that. It is suggested the Committee examine whether or not the budgetary increase has kept pace with inflation over a 5-10 year period.
- 1(v) There is undoubted difficulty in terminating projects and the Research Council's policy of concentration at times exacerbates this difficulty. For example, if an IRC has received major capital investment and carries significant numbers of staff on academic salaries and conditions, there will be very strong pressures to continue, even if the research is less timely and exciting than when initiated. The CDP is unaware of any problem in terminating projects supported through grants in the responsive mode. Another reason may lie outside the Research Council's responsibility, namely, the ability to have proper contingency funds and carry-over arrangements to cope with the ebb and flow of funding from year to year.

2. The Research Council's budget allocation for 1991-92, although not in line with inflation, does not seem to have been treated any more harshly than a number of other budgets. The difficulty that the CDP foresees arising is that there will be even less money for responsive mode funding which is effectively the only funding for which polytechnics can currently compete (the Polytechnics and Colleges Funding Council has just decided to make some £7 million available for research; the basis on which this will be allocated has not yet been determined).

3. See above.

4. The most pressing financial problem for the polytechnics remains that of capital provision for building, maintenance and equipment. The system of funding via the PCFC which forces all institutions to take more students for less money is raising increasing problems.

5. The polytechnics keep the balance of their portfolios under review within the context of their strategic plans.

CHANGES TO THE DUAL SUPPORT SYSTEM

1. It is important that the questions be considered in relation to both the polytechnics and the universities. The polytechnics do not have the benefit of the dual support system and it is very much more difficult for them to support the speculative ideas of their staff. The changes, therefore, would be in no way detrimental to the present situation in the polytechnics. In regard to Research Council-funded projects, the transfer of funds will be of great assistance to the polytechnics in that projects will now be properly funded with overheads included: this has not been the case in the past. In general, the polytechnics believe that a research environment and ethos is very important to the delivery of teaching in higher education. It enlivens teaching programmes, generates undergraduate and postgraduate projects, inspires students and staff and in due course may add to the equipment and facilities available to the institution.

2. The question betrays only limited understanding of what is proposed at this stage. The government is talking of moving only about £100 million in order to enable Research Council grants to cover the costs of research more fully than hitherto. Even so, academic staff time is excluded. In a total budget of £850 million, this is merely tinkering at the edges and corresponds roughly to the transfer of what has been known as the DR element in research funding to the Research Councils. Such a limited adjustment is unlikely to result in any significant change, particularly since the universities receive approximately 95 per cent of all Research Council funding. The CDP would advocate a much greater transfer of funds than £100 million.

3. The CDP does not envisage any problems with the new system. Responsible management ought to be able to arrive at adequate estimates of research overheads. Commerce and industry can do this and higher education institutions which engage in contract research with or for industry have to identify their costs very clearly. The CDP sees no reason why this should not be possible in all higher education institutions.

4. If, in the old system, the DR element was meant to cover overheads (direct and indirect costs) of research grants, it was in practice somewhat chaotic. The match between those institutions receiving the research grants and the distribution of corresponding DR overheads was not at all good. To identify the money clearly and accurately with its intended purpose must represent an improvement. The disadvantage that the CDP perceives in the new approach rests in the fact that proposals do not include the staffing element. If a research project is judged worthy, then in the CDP's view it should be funded in total, including the staffing element. This would help to make accountability for the use of public money clearer.

20 March 1991]

[Continued

Letter to the Clerk from Professor K J Durrands, Polytechnic of Huddersfield

I am responding on behalf of my Institution and as a member of The Parliamentary and Scientific Committee to your request in your 13 February letter to submit evidence to your Committee by the 22 February.

We have to accept that the decline in the scientific budget simply reflects the decline in the UK economy and our lack of ability in the UK to create wealth. As an engineer I have taken an interest in these matters for some 35 years and with many others tried to bring about a major change in policy which would give design, development, making and selling top priority and direct our resources accordingly.

Since the second world war we have spent a great deal of money on research, much of it in the universities, but unfortunately this expenditure has not been reflected in the health and growth of the UK economy. Our share of the high added value machinery and equipment market has steadily declined and in some instances, for example, the manufacture of looms we are not competing at all as the loom manufacturers in the UK have gone out of business.

To regain our share of the high added value machinery and equipment market would require many well directed research, design and development programmes which may take 10 to 15 years to come to fruition bearing in mind the development time already lost since we were pushed out of the market. Such programmes I fear would not be agreed to in many board rooms in the UK without the support of public money and resources. The exception to this hard policy proposal would be medical research, which usually by its nature is directed towards achieving a clear beneficial object.

The position has not been helped by the creation of science dinosaurs, which have then made enormous demands on the annual research budget leaving little or no funds for small projects carried out in most universities and polytechnics to support the work of their local and regional industries and therefore wealth production.

Clearly, while we must improve our ability and skills to apply our own research and that from other countries to wealth production we must also, until our economy has greatly improved, carefully direct more of our research resources towards wealth production. Directed research, design and development is as intellectually demanding and often turns out more interesting than the speculative research derived from freely exercising ones curiosity. Given our balance of payments position we should perhaps use import substitution to guide us in establishing some major research, design and development programmes.

I apologise for these rather hard views but it is very disappointing for my Institution, given the background over the years of the steady declining economy, that our work with industry, for example, the improvement of existing products, and the design and development of new products has been limited and poorly resourced and has had to be subsidised from our meagre teaching budgets. It is essential for Polytechnics to be involved in research, design and development in collaboration with industry in order to maintain their ethos and the quality and standard of their work.

Professor K J DURRANDS
Rector

Written evidence from the Economic and Social Research Council

1. The Economic and Social Research Council (ESRC) has the smallest allocation of all the Research Councils from the Science Vote—£35.5 million in 1991-92. Its long-term aims are five-fold:

- To support the highest quality social science research in universities, polytechnics and independent research centres.
- To promote interdisciplinary and inter-Research Council research.
- To increase the number, skill and expertise of social science researchers in higher education, government and business.
- To modernise social science methods and research resources.
- To increase recognition of the value of social science.

In pursuit of these aims, ESRC has programmes for funding research and postgraduate training in higher education institutions (HEIs); it has no research institutes of its own.

2. The Council's evidence follows the questions posed by the Select Committee in its invitation.

RESEARCH COUNCIL FUNDING

To what extent are Research Councils' current financial difficulties the result of:

- (i) The overcommitment of resources and, by implication, poor financial or strategic management on the part of research councils.
- (ii) The failure of government to make an adequate allowance for increased academic salaries.

*20 March 1991]**[Continued]*

- (iii) Increases in subscriptions to international projects.
- (iv) The failure of budgetary increases to keep pace with inflation.
- (v) Any other reason.

3. The Council's main concern is that inflation has been above what was realistically allowed for; this is especially true of academic salaries which account for 55 per cent of costs. However, the ESRC recognised this last summer, revised its inflation assumptions upwards and reduced its proposed volume of activity proportionately. In consequence, the ESRC is currently operating within its Science Vote allocation and is not facing any prospect of overspend.

4. But the cutbacks it made in social science were severe. They included:
- Limitations to the funding of major new research programmes on global environmental change, analysis of the 1991 Census data and in two new research centres in economics.
 - Reductions in continuing commitments to research programmes in macro-economic modelling, health economics, education, the effects of demographic change, and information and communication technologies.
 - Delay in the expansion of postgraduate training to meet the manpower demands of the 1990s.

What is your view about your Research Council's budget allocation for 1991-92? What difficulties do you envisage arising out of this allocation, i.e., will it constrain your activities in any way or lead to the untimely end of projects?

5. ESRC is disappointed with the allocation for 1991-92, which is considerably less than the resources needed to fund programmes sufficiently to secure its long-term aims. However, the allocation will allow further work to be done in two areas of major national importance:

- A new initiative on the human causes and consequences of Global Environmental Change.
- A second tranche of projects on the current social, economic and political transformation of Eastern Europe.

Beyond those, existing projects should be able to run for their planned duration, albeit (as stated above) at lower levels of funding. However, the number of new research grants and studentships the Council wish to award will be constrained by this allocation.

The Secretary of State considers that the science budget for 1991-92 "provides the basis for the continuing development of the country's science base" (HC Deb 9 Nov 1990 cols 29-30). Do you agree?

6. Development of the human and intellectual capital of the country's science base involves long lead times to bring new manpower, new data sources, new research methods and new research results on stream. This in turn necessitates continuity of funding which allows realistically for inflation. For the further development of the social science base, the Council's current priority is the pursuit of its related aims of increasing the number, skill and expertise of social science researchers and modernising social science methods and research resources. Its current budget provides insufficient resources for the rate of development which the Council wishes to pursue in these fields.

What is your most pressing financial problem? Will the present financial difficulties lead you to reconsider the balance of your portfolio?

7. As a result of the cutbacks decided by Council last July, ESRC does not have pressing financial problems. But those decisions have introduced imbalances into the Council's portfolio:

- Between research modes: most notably in the less than planned expansion of support for research centres—24 per cent of the research budget is available for research centres in 1991-92 against a target range of 33-40 per cent in the 1990 Corporate Plan, revised downwards to 25-35 per cent in the 1991 Corporate Plan.
- Between its research and its training programmes in the deferment to later years of the planned expansion of support for postgraduate training.

8. But beyond this, the ESRC wishes to draw the Committee's attention to the difficulty of sensibly planning research with the current mechanisms for handling public expenditure in the Science Vote. Under these excessive attention is given to year 1 of the Public Expenditure Survey (PES) period, decisions come late in the preceding financial year and there is limited flexibility for the carry-over of expenditure from one year to another. This provides insufficient time for the processes whereby the ESRC—which, as stated before, has no research institutes of its own—invites researchers in the HEIs to compete for the available funds. The perverse result of this "short-termism" is that economy becomes the enemy of effectiveness and efficiency.

20 March 1991]

[Continued

CHANGES TO THE DUAL SUPPORT SYSTEM

What is your view about the proposed changes to the Dual Support System? What will be the impact of the transfer of money from the UFC to the Research Councils on:

- (i) Teaching.
- (ii) Research council funded research; and
- (iii) The capacity of Higher Education Institutions to maintain the "floor" of research capability enabling speculative ideas to be explored.

9. The Council welcomes the change in the boundaries of the Dual Support System planned from August 1992. It will then be responsible for meeting all the major costs of the research it funds, except for academic salaries and premises. The Council believes this greater clarity and accountability will benefit all concerned.

10. However, it is possible that some of the Council's existing mechanisms for funding research will no longer be appropriate for the new arrangements. The Council is already beginning to consider (and in due course will consult HEIs on)

- New ways of providing for "seed corn" research (not quite as Item (iii) of the question poses it) alongside continued support from the UFC and PCFC.
- The balance between single short period grants and long term investments.
- The particular implications of the changes for social science departments in HEIs.

Will the new system accelerate the de facto emergence of research-based and teaching-based universities?

11. This appears possible.

What problems do you envisage with the new system? To what extent is it possible to make an adequate estimate of research overheads?

12. The ESRC hope that the current exercise by the Heads of Research Councils (HORCS) and the Committee of Vice Chancellors and Principals (CVCP) will identify an appropriate percentage addition which is as small as possible. Particular issues for the social sciences are the funding of

- Libraries (including data sources as well as publications) which must form part of the "well found laboratory" for the social sciences.
- Premises and equipment which are increasingly required for large scale data handling in the social sciences.

What are the advantages and disadvantages of the new system?

13. It is too early to judge with any certainty. The new system should provide better accountability for public expenditure on research in HEIs and yield better information for the allocation of Science Vote resources. On the other hand, the dangers are that it will reinforce the current trend towards a greater reliance on contact employment for researchers, it will increase uncertainty in HEI financial planning, and—as with many funding changes—the pattern of winners and losers for particular fields of science may be unpredictable.

WILLIAM SOLESBURY

Secretary

Economic and Social Research Council

21 February 1991

Letter to the Chairman from Sir Francis Graham-Smith

I have already sent to you a copy of my letter to Chairman SERC on some of the effects on astronomy of the cuts in the APSB budget for 1991-92 and onwards. These examples concerned international programmes in astrometry, and in particular Hipparcos and the Carlsberg Transit Circle. Almost all of the APSB programmes are similarly international; astronomers naturally collaborate with overseas colleagues, often from geographical necessity, and often to share the costs and the advantages of common observational sites and apparatus. The astrometry programmes are low cost and provide a data base for many other programmes, both in the immediate future and over many decades to come. I now draw your attention to larger scale programmes, and set among these the growing problem of funding Jodrell Bank.

Both the SERC and the Royal Astronomical Society have recognised the need to concentrate resources on the best programmes and projects. In the "Ground Based Plan" they agreed that the highest priority should be given to the MERLIN network and to the proposed 8-metre optical telescope. The extension of MERLIN was funded; in the event this was the only part of the Plan which went ahead. Most other new programmes in astronomy may now be lost, except for the space project SOHO/Cluster which is an ESA "cornerstone". Existing telescopes are expected to continue, although spending on vital instrumentation will be cut by one-third.

*20 March 1991]**[Continued]*

Jodrell Bank has for some years been an increasing financial burden on Manchester University, while it has become a progressively more important national and international facility. The grant for extending MERLIN, mainly by providing a new radio telescope at Cambridge, was made on condition that MERLIN would be available on the same basis as the telescopes run by the two Royal Observatories. The rolling grant from SERC has not, however, been increased to make this possible. The budgetary deficit met by the University has now grown to £800K, while the terms and the amount of the UFC grant make it impossible to find this amount by taxing other sections of the University. The improved MERLIN will be in service early this summer, and the first time allocations have been made in collaboration with SERC. Over half the allocations originate from outside Jodrell Bank; most of these are from overseas, although partners from within Jodrell Bank are usually involved.

We have, of course, discussed this situation with Chairman SERC. He is unable to help in the present financial crisis, although it must be obvious that Jodrell Bank should be regarded as a national asset alongside the Royal Observatories and the telescopes which are funded through them. You will see that our problem is not an immediate consequence of the cut in the SERC budget; instead, it is a problem which has become important at the same moment so that its obvious solution has become unavailable. The future resolution of the problem is made more uncertain by the reputed advice of the ABRC to the DES, in which the recommendation is to reduce still further the funding for basic science.

I appreciate that you wish your Committee to consider general issues rather than particular problems, and I hope you will excuse this concentration on a single but major project. I believe it contains references to several important matters which you will wish to consider.

FRANCIS GRAHAM-SMITH

Written Evidence from The Institution of Electrical Engineers

The Institution of Electrical Engineers is concerned about a number of issues relating to the science budget 1991-92 and offers the following comments for consideration by the Select Committee. The Institution's primary concerns relate to the problems currently being encountered by the Science and Engineering Research Council, with which many of its members have direct involvement, but it believes that many of the issues raised apply more generally.

The Institution's main concern is the failure of the Secretary of State for Education and Science to take adequate account of inflation, currently running at 9 per cent or above, since to provide an increase of only 3 per cent must inevitably reduce the amount of research which can be funded. This effective reduction in the resources available for Government funded research is of particular concern because recent figures compiled by the OECD show that the UK continues to trail behind its European partners with both Germany (2.84 per cent GDP) and France (2.38 per cent GDP) spending more than the UK (2.20 per cent GDP).

The financial problems which the SERC and the other research councils now face appear to owe much to increases in cost over which they have little or no control. Substantial cost centres within the SERC include wages and salaries, both of internal staff and of grant funded researchers. In neither case is the SERC a wholly free agent, since the level of its staff costs are determined by Civil Service pay scales, and those of the researchers are linked to the pay of academic staff in the universities. Other substantial expenditures are related to the provision and operation of large scale research facilities in the UK and overseas. For all of these the SERC has to accommodate increases over which it again has little or no control. Closing down large scale facilities would mean abandoning long run programmes, and might lead to increased short term costs, while for overseas activities this could involve the UK in disregarding treaty obligations.

While the Institution would not wish to see work continue without regular reviews the arbitrary termination of previously approved programmes, in order to deal with short term financial problems, cannot be justified. As noted the problem should be short term if the Government is correct and inflation falls significantly during the next year.

The Institution is particularly concerned that in order to meet these increases in salaries and other costs the SERC will have to reduce the amount of unsolicited research it funds, and this will mean that work in strategic science and engineering will suffer to a disproportionate extent.

The other point to which the Institution wishes to draw attention is "annuality", or the process by which the research councils are required to operate on annual budgets. This causes severe accounting problems when dealing with programmes, many of which extend significantly beyond one year and where the incidence of expenditure often departs substantially from that planned. It is easy to argue that plans must be adhered to, but the reality is that research can never be treated as a routine activity and, inevitably phases will take longer or be shorter than planned. The introduction of some flexibility to their budgetary regimes would significantly simplify the accounting procedures required within the SERC, and the other research councils.

*20 March 1991]**[Continued]*

I trust the Committee will find these comments useful, and confirm that the Institution would be happy to provide additional comments if required.

**Letter to the Clerk from Dr Richard A Y Jones, MA, MS, PhD, CChem, FRSC,
Pro-Vice-Chancellor, University of East Anglia**

I am writing to submit comments to the House of Lords Select Committee on Science and Technology.

Firstly, in response to the general concerns of the Select Committee, I would say that we believe the main problem to be the failure of the Science Budget to keep pace with the real level of science inflation. Science at the cutting edge is inevitably expensive, both in terms of the highly skilled manpower required and in terms of the equipment. The effective rate of inflation for science expenditure is almost impossible to measure, but it is certainly well above the normal inflation rate. Even if government funding keeps pace with general inflation in the economy, and even if the government is concerned not to discriminate in any way against science, that is not enough to ensure adequate levels of funding for the kind of science that the UK needs.

The arguments about the expense of the highly trained manpower that we need for science are well-rehearsed elsewhere, as indeed are those about equipment. Nevertheless I should like to emphasise the problems of equipment funding. Scientific equipment is becoming more expensive—the growth of costs is not merely the result of increases in the price of individual items of equipment, it is also the result of the need for much more equipment to be used than in the past. Even for such traditionally “small science” as the biological sciences, the need for increasingly sophisticated equipment is becoming ever greater. We cannot hope to keep abreast of developments in the crucially important and very rapidly developing biotechnology field unless today’s, and indeed tomorrow’s equipment, is available.

On the matter of priorities amongst different kinds of spending on research we should like to make the following points:

- (1) For the general health of science in the economy and in order to ensure that science is widely integrated into society and industry, we believe that it is essential for the science base to be kept as broad as possible. This means that, if choices have to be made between “big science” in a small number of concentrations and “small science” in a large number of institutions, then we believe that the latter should be favoured. That is not to say that a low priority should be accorded to “big science”. Long term developments may depend crucially on the efforts put into “big science” and we would urge that sufficient money be put into the science budget to cover both.
- (2) International collaboration in science programmes takes two forms—firstly the membership of such bodies as CERN and the Institut Laue Langevin, where the comments under (1) above about “big science” apply; and secondly participation in European Community research programmes. The latter are extremely important in a number of ways:
 - (a) They bring together scientists from a variety of backgrounds which can of itself be very productive.
 - (b) They support larger scale projects than would easily be possible on a purely national basis.
 - (c) They focus attention on the potential for exploitable science, which can be used for the economic benefit of the countries of the European Community.
 - (d) In many cases they bring together academic and industrial scientists to work co-operatively.

Some significant difficulties stand in the way of full use of the funding opportunities available under European Community programmes by UK institutions. Chief among these is the fact that the Commission will allow only 20 per cent for overheads on their projects. This is a rate which applies across the Community and which is unlikely to be changed. The difficulty for UK institutions is that 20 per cent for indirect costs is much less than is effectively provided for Research Council funding and that no allowance is made in government funding for universities for the necessary additional funds. We should like to see some provision in the Science Budget for additional DR money to compensate universities for the low overhead rate. The second disincentive relates in a way to the first, and is, namely, that success in obtaining European Commission funding is, we understand, reflected in a corresponding reduction in the funds provided for research in the same areas by British Government funding. Apart from the disincentive effect, such a reduction seems to be against the European Commission’s rule that their funding is additional to national funding and not a substitute for it.

- (3) It is a corollary of what we have said in (1) above that we feel that the encouragement of the entry of students into scientific careers is necessary. Postgraduate training must therefore be a high priority. As between project and programme grants, there are arguments on both sides: programmes effectively collect together what might otherwise be a less coherent set of related projects and thereby provide useful co-ordination, but on the other hand they tie more money up less flexibly. We believe that a balance should be kept between the two kinds of grant and that programme grants should be subject to continuing review to ensure that funding for them

20 March 1991]

[Continued]

continues to be justified in terms of the science they produce. In some ways, Research Centres are, perhaps inevitably, still less flexible. They can be extremely effective at carrying forward major science, but we do not believe that the establishment of large IRCs should be at the expense of support for project grants for excellent smaller scale science. The numbers of unfunded alpha projects have already grown to a level which is dangerous for the motivation of the current and future generations of scientists, and we should not like to see further deterioration of the success rates for such applications.

- (4) Our concerns about the motivation of scientists in the current difficult situation means that we should be most vigorously opposed to any suggestion that contract researchers should be subject to lower salary increases than other academic staff as the result of research council problems. Contract research staff already tend to be treated as lesser citizens, and recently universities have been considering how better to integrate their conditions with those of normal academic staff in response to initiatives from CVCP and the AUT. We believe that the proper indexation of research staff salaries is one of the highest of priorities. It may be possible in a few cases to make savings within project budgets so that the extra funds needed are somewhat less than the full costs of the increases in salaries, but given the pressures on the dual funding system and the extent to which project grants are in any case pared down, these cases will be in the minority. We should not wish to see any general imposition of cash limits on projects budgets that simply placed a further burden on university budgets by effectively transferring to them the extra costs of the salary increases.
- (5) On the changes to the dual support system, we believe that these represent an unnecessary complication and a diversion of efforts in unproductive ways. The new UFC funding system identifies perfectly adequately the amounts of money used for research purposes in universities, and we should like to see the proposals for the transfer of DR funding to the Research Councils abandoned, even at this advanced stage. I attach as an appendix some views on this matter.

To that appendix I would add that one undoubted effect of the transfer would be to erode the effective "floor" support for research. Money which has hitherto been incorporated in the block grant from the UFC has been money on which the universities could base some longer term planning. The same money attached to individual project grants represents a much less stable resource and would have to be treated accordingly. The advantage might be that it made universities more immediately "responsive" in these areas, but at the cost of the kind of patient longer term effort which is fundamental to the continuing health of the science base. A quick fix now is no substitute for a far greater medium or longer term benefit.

I hope that these comments will be of use to the Select Committee.

Dr R A Y JONES
Chairman
Research Committee

APPENDIX

TRANSFER OF DR FUNDING FROM THE UFC TO THE RESEARCH COUNCILS

When the then Secretary of State for Education and Science made his speech to the Academia Europaea in June 1989, in which he indicated that changes were needed in the dual support system, he also reaffirmed the Government's support for that system. The aim of the change relating to the transfer of DR was not to introduce radical change but rather to clarify the division between support for the basic infrastructure (provided via the UFC) and support for targetted research projects (provided via the Research Councils). The dual support system would continue to exist but Research Council funding of individual projects would cover more of the costs of projects than it does at present.

The attraction of the change was that more of the total cost of individual projects would be clearly identified and covered by the one source. Arguably the result would be better control over the allocation of resources to cover the costs of those projects. In principle the aim was a reasonable one, and universities, including my own, were prepared to go along with the changes.

It is now clear that in practice the transfer of DR from the UFC to the Research Councils is fraught with greater difficulties than had at first been envisaged, to the extent that the proposed changes are a threat to the system rather than an improvement. Firstly it has proved highly problematic to identify the basis for calculating the full costs of projects (even after excluding academic staff time and premises costs). No satisfactory solution has been reached to that problem and a good deal more work is currently in progress. Secondly the Research Councils themselves have still to agree detailed arrangements for the monitoring and control of expenditure on indirect costs associated with their projects under the proposed new system. Thirdly, the proposed system did not cater very satisfactorily for research grants from UK charities (an addition to JR was inconsistent with the Research Council basis and would be awkward to administer).

*20 March 1991]**[Continued]*

Fourthly, the impact of the new system on universities will be uncertain and will add to sufficient existing uncertainty. Fifthly, the timing of the introduction of the new arrangements, first heralded in 1989, has already slipped and is now set at 1 August 1992, that in itself representing a tight deadline given the work remaining to be done.

The discussion of the new arrangements has already consumed disproportionate effort. Much more effort is still needed to settle the precise form of the arrangements, and the implementation phase will clearly be more complex than appeared likely at the outset. All along we have been uneasy about the amount of unproductive effort inherent in such a change (intended, it must be remembered, to be neutral in effect), but recent developments in the SERC in particular have increased that unease to something nearer alarm.

The present financial crisis in SERC demonstrates only too clearly the dangers of the proposed DR transfer. If they had received their "share" of DR this year, can one imagine that they would have had the political resolve or ability to use it other than to wipe off the deficit? The evidence is clearly that SERC do not have the mechanisms for controlling expenditure that would be required for competent and accountable administration of DR.

What mechanisms are there to ensure that, whatever assurances may be given now, the money would remain earmarked for research grant support? Is it not inevitable that it would eventually—and sooner rather than later—become lost within Research Council general funding and used to alleviate short term rises such as SERC's current deficit or unpredicted increases in international subscriptions?

Rather than perturbing what is essentially a working system, we believe that the Government should concentrate on ensuring that UFC DR payments are properly monitored and controlled within universities. The mechanisms for that are already largely in place, and with the new open funding system any further monitoring and control will be relatively easy to implement. Universities have come to terms with the separation of UFC funding for teaching and research, and certainly at this University our model for internal allocation of funds already provides just the kind of information necessary for keeping track of how the various components of research funding are used.

We believe that the time has now come to drop this particular proposed change and to concentrate efforts on making the monitoring of UFC funding for research work properly, and we hope that the Government will be willing to modify its policy accordingly.

Written evidence from Professor A Kelly, University of Surrey

GENERAL POINTS

1. Britain has a severe "economic performance" problem due, amongst other reasons, to a shrinking industrial sector. Our real growth of Gross Domestic Product per Person is one of the lowest in Europe and has a similar pattern to that of the USSR. There are several distinct elements to the industrial sector but the two main ones are the process industries and the manufacturing industries. The former lean very heavily on the scientific innovation of chemistry whereas the latter relies on engineering technology with inter-related disciplines required to produce a product. Thus the wealth creating activities of the country rely heavily on R&D with different emphasis of science and engineering in different industrial sectors.

2. In a healthy competitive economy the R&D grows faster than the economy, but if the level of R&D is too low, the manufacturing sector begins to shrink, and the economy drifts into balance of payments problems unless growth is restrained. It enters a "vicious circle".

The UK has been lagging behind her competitors both in the level and the rate of growth of R&D. In the case of the UK, this is approximately 2 per cent of GDP and falling, whereas our main competitors have higher values and have an upward trend. It is calculated that an extra 0.4 per cent of GDP needs to be found to make good this competitive gap over the next few years; a tough target at an extra one and a half to two billion pounds per annum at today's prices.

But the story is even more complicated than that. A shortage of investment in manufacturing and the infrastructure compared with competitors reduces the ability of the economy to embody and exploit technological change fed in by increased R&D. Low growth plus relatively high interest rates and inflation, as well as rapid fluctuations in interest rates, inflation and exchange rate, all have a direct bearing on the investment decisions made by industry.

Research by the Federal Reserve Board of New York in 1988 showed that capital for investment in a British R&D project with a ten year pay-off lag needed to provide a return almost three times that of an equivalent Japanese programme. The average required rate of return over the period 1977 to 1988 shows pay-offs of 7.6 per cent for Japan, 14.3 per cent for West Germany, 15.6 per cent for the US, but a surprising

20 March 1991]

[Continued

24.8 per cent for Britain. An environment which forces industry to set a much higher hurdle rate of return will preclude investment opportunities which can be exploited by the competition. This situation may well explain the difference in growth between Japanese and British companies.

It is therefore surprising that, contrary to the international opinion that we need substantial extra funding in R&D, we are reducing in real terms our expenditure in Research Councils related to Science and Engineering.

3. In addition to direct research funding, HEIs provide training and education for wealth creators in society. The level of skills available dictates the ability of our industry to handle high technology; inadequate levels reduce the ability to remain internationally competitive. It feeds directly into productivity, quality, cost savings and all levels of management efficiency. We have an extremely poor record of educating and training our 16-19 year-old population and we also have an inadequate proportion of graduates within our population. Reduced support through the Science Budget to support advanced training courses and research staff help to destroy the infrastructure of HEI education and training provision in this area.

4. *Research Council Funding*

While for strategic reasons mentioned above, the resource allocations should be substantially increased, there is a need for a thorough review of the structure and management of Research Councils, particularly SERC.

Thought should be given to separating salary arrangements for SERC sponsored research staff from university salary structures. At the very least, adequate provision for salary rises should be built into budget productions as salaries normally are a significant proportion of research grant allocations.

Dependence on international subscriptions should be reduced and agreed costs should be made for longer periods than one year.

5. *The Dual Support System*

The idea of involving Research Councils in the direct allocation of university research funds is suspect at the present time. If Government policy persists in scaling down Science Budget allocation, then inevitably this source of research funding to universities would reduce with serious implications for the national and international stature of university research. The perceived "overhead" of just below 40 per cent on research grant income, which would be distributed by the Councils, is already too low to support the infrastructure of research. It is likely that this percentage will further reduce with the new proposed allocation system. The ability of the Councils to manage themselves also brings into question their ability to be more widely involved in the affairs of universities.

ENGINEERING PERCEPTION OF THE CUTS IN THE BUDGET

1. SERC is the Science and Engineering Research Council and this is too often overlooked (e.g., the "Save British Science" movement). It is a fact that the UK supports almost as many astronomers as does the USA (i.e., about four times as many on a *per capita* basis) but far less engineering researchers than, say, USA or Japan. It is clear that SERC does not focus on short, medium and long-term research areas which can potentially improve GNP.

2. The Engineering Board overall has received a budget cut of about 10 per cent. However, surprisingly this budget has not been evenly distributed with Advanced Computer Aided Manufacturing in Engineering (ACME) receiving a 20 per cent cut on a well-managed budget. Information Technology has received the largest cut in absolute terms. It seems that areas of engineering research which contribute mostly directly to GNP are subjected to severe cuts suggesting a lack of clear national objectives contained within the Research Council's brief.

Faculty of Engineering

Written evidence from the Medical Research Council

RESEARCH COUNCIL FUNDING

1. To what extent are Research Council's current financial difficulties the results of:

- (i) *The overcommitment of resources and, by implication, poor financial or strategic management on the part of Research Councils.*

The MRC has in place established strategic and financial planning mechanisms which allow the Council and the Strategy Committee to exercise effective management of resource allocation and

20 March 1991]

[Continued

control. Difficulties associated with annuality and carry-over and the need to fully commit resources (see 1(vi)) have meant that short-term measures have had to be introduced within financial years to deal with unexpected problems (e.g. exceptionally high pay awards). The fact that the need for such measures can be identified and quickly responded to illustrate the soundness of the control systems in place. The implication of the question is that a Research Council might deliberately commit expenditure against resources it has not secured (and is not likely to secure) and thus make awards which, in the event, cannot be funded. That is not a policy operated by the MRC.

(ii) *The failure of government to make an adequate allowance for increased academic salaries.*

This is an important component in causing financial difficulties. The MRC is tied into a number of national pay models for its own staff and for those supported through grants. The MRC has no direct say in the negotiation of the annual pay increase/restructuring of each pay model but has to meet the associated financial costs. Academic—related salaries form a large part of MRC's annual pay bill. As one example of the effect it was calculated that academic—related pay increased by about 9.5 per cent between 1989-90 and 1990-91 financial years whereas the MRC's grant-in-aid increased by about 5.4 per cent over the same period. The shortfall on academic—related salaries is estimated to have cost Council some £2 million—which represented a volume reduction in the amount of research that could otherwise have been funded. (See also 1(iv).

(iii) *Increases in subscriptions to international projects.*

The main MRC commitment with significant financial implications is to the European Molecular Biology Laboratory. Although the Laboratory's budget has tended to grow inexorably in real terms—by about 1 per cent or 2 per cent annually—the costs have not been substantial (real increases of tens of thousands of pounds annually). Increases due to currency fluctuations (paid in D marks which have been a particularly strong currency) have been to some extent offset by reductions in the UK share of the overall budget as the UK GDP has declined in comparison with other member nations. However the overall annual contribution (2.7 million in 1990-91) becomes increasingly difficult fully to justify within a grant-in-aid declining in real terms.

(iv) *The failure of budgetary increases to keep pace with inflation.*

Perhaps the best illustration to answer the question is to quote from the MRC's current Forward Look which compares planned future income with two different inflation planning assumptions.

The Council's present assumptions are that pay awards will be 9 per cent in 1991-92, 6 per cent in 1992-93, 5 per cent in 1993-94 and 5 per cent in 1994-95, and the level of inflation affecting the other heads will be 10 per cent, 7 per cent, 6 per cent and 6 per cent. In consequence the cost to Council of maintaining the existing volume of activity would be:

	£ million				
	1990-91	1991-92	1992-93	1993-94	1994-95
Pay related expenditure	128	140	148	155	163
Other expenditure	76	84	89	95	101
Total	204	224	237	250	264

On the basis of the ABRC inflation assumptions (which are slightly lower than Council's) the costs of maintaining volume would be:

	£ million				
	1990-91	1991-92	1992-93	1993-94	1994-95
Pay related expenditure	128	138	148	156	163
Other expenditure	76	81	86	89	93
Total	204	219	234	245	256

These cost can be compared with the current planning figures of income to be available to Council of:

	£ million				
	1990-91	1991-92	1992-93	1993-94	1994-95
Grant in aid (excluding special funding for CRI building)	186	196	200	203	209
Other recurrent income	18	20	22	21	20
Total	204	216	222	224	229

20 March 1991]

[Continued]

The following sums would therefore have to be removed from expenditure—through reducing the volume of research—to balance the books, or would have to be added to the Council's income to offset the effects of inflation:

	£ million				
	1990-91	1991-92	1992-93	1993-94	1994-95
<i>Council assumptions</i>					
Funds needed	0	8	15	25	35
As per cent of total income	0	4	7	12	16
<i>ABRC assumptions</i>					
Sums needed	0	3	12	21	27
As per cent of total income	0	1	5	9	12

After allowance has been made for special allocations for specific purposes (e.g. for the AIDS programme, for Interdisciplinary Research Centres) budget increases over the past few years have shown a similar mismatch with inflationary costs.

(v) *The difficulty of terminating projects.*

The MRC's planning mechanisms assure that activities cease (e.g., project grants, training awards) or are stringently peer-reviewed in competition (e.g., MRC Units, renewals of programme grants) within each quinquennium. This provides the opportunity to cease to fund existing projects to enable higher-quality new research to be undertaken. There are always difficulties when terminating projects because it almost inevitably means the break-up of an established team which will generally have supporters within the research/user community. The MRC has been used to taking such decisions—unpleasant though they are, particularly when MRC employers are concerned—but the difficulty has now become much greater because the standard that has to be reached to remain within the MRC portfolio (or to be admitted to it) has now risen to a level where discrimination has to be made between "alpha-quality" pieces of research. That, rather than the intrinsic difficulties associated with stopping a piece of research, is the new and greater difficulty facing MRC when reviewing the continued funding of existing projects.

(vi) *Any other reason*

As suggested in the response to 1(i) there are technical difficulties which do nothing but exacerbate the situation. Broadly speaking these may be summarised as:

- Not knowing until a few months before the financial year begins exactly how much the grant-in-aid will be and having only cash-limited planning figures (with low inflation assumptions) for the following two financial years (within which planning has to be undertaken and balanced budget produced). The 1991-92 grant-in-aid was not formally announced until late January 1991.
- Having only very limited authority to move funds between financial years (and then only in a forward direction). This means that anything other than a small underspend (about £4 million) is penalised by losing funds and there is no way in which funds can be built up for future use through prudent and planned savings. This means that the annual spend of some £200 million has to be controlled within the window of £196-200 million if the MRC is not to be penalised for underspending or stand accused of "overcommitting resources". Given the nature of the MRC's business (e.g., without a commercial company's ability to control the volume and price of products) balancing the books annually (and making sufficient allowance for the many unknowns) becomes increasingly hard to achieve.

2. What is your view about your Research Council's budget allocation for 1991-92? What difficulties do you envisage arising out of this allocation?

The MRC's income for 1991-92 (excluding a special capital allocation for the clinical research initiative) is 5.8 per cent larger than that for 1990-91 whereas MRC estimates that costs will increase by about 9.7 per cent. As the answer to 1(iv) shows, it is expected that similar difficulties will arise in respect of future financial years. As a result the Council, at their meeting in January 1991, had to endorse a set of measures to balance the cost of planned activities and known commitments against forecast income. The difficulties and constraints may be summarised as follows:

20 March 1991]

[Continued

MRC Units

- The allowance to be made available for inflation on recurrent expenses allocations remains restricted to $2\frac{1}{2}$ per cent p.a.
- The 1991-92 allocation for capital equipment is reduced from £7.0 to £5.5 million.
- The 1991-92 allocation for capital building will be held at £5.1 million but projects already authorised will consume most of that allocation and very few new requests from directors will be approved for funding.
- For financial planning purposes the Council will be identifying "savings" of £3 million in 1992-93, £6 million in 1993-94 and £9 million in 1994-95 to be made against existing commitments to MRC Units.

Other forms of support

- Project grants provision will be maintained at planned cash levels but this will result in a reduction of up to 30 per cent in the number of new awards made each year over the next three award years.
- The funds available to the Research Boards for new awards during the current award year will be reduced by about 25 per cent.

3. The Secretary of State considers that the science budget for 1991-92 "provides the basis for the continuing development of the country's science base". Do you agree?

The answers to earlier questions will show that MRC could not agree. Quite apart from the difficulties already identified, the threat to existing high-quality work and the continuing need to decline to fund a substantial proportion of the new alpha-quality proposals being presented, there remains the difficulty not only of living with a declining budget but planning to continue to live with decline given the burgeoning opportunities and needs now presenting themselves. To this must be added the inability fully to address a number of key problems. As to the latter a good illustration is the level of the postgraduate studentship stipend where the MRC has been able to begin to redress the current low level of stipend by agreeing increases of £1,500-2,000 a year with effect from October 1991—but at the cost of reducing the number of awards to offset the increased cash needs. On opportunities the MRC continues to identify a number of excellent possibilities and key needs for new research, including:

- The genetic approach to human health (particularly the development and evaluation of new diagnostic and therapeutic approaches).
- Stem cell biology (including the development of the embryo and adult response to tissue damage).
- Structural studies (the relationship between macromolecular structures and normal and abnormal biological function).
- Spongiform encephalopathies.
- Brain repair and behaviour.
- Molecular neurobiology.
- Diabetes.
- Medical imaging.
- Human nutrition and relationships to health, performance and disease.
- Environmental factors and their impact on human health.

4. What is your most pressing financial problem.

This is essentially covered by earlier answers. But, in short, to raise the grant-in-aid to a level where there can be a much fuller and positive response to the scientific community's proposals, the research associated with the nation's health needs and research training requirements to secure the future research base; and once established to have securer medium-term funding with much more realistic protection against inflationary costs.

5. Will the present financial difficulties lead you to reconsider the balance of your portfolio?

Again, this has been covered by earlier answers. If income is as predicted it is clear that some existing research that the MRC would wish to retain in the portfolio will have to be terminated; new work that the MRC would have wished to admit to the portfolio will have to go unfunded. Over the past year individual areas which have suffered in this way have included cryobiology, gene structures for neurotransmitter receptors and hypertension research. Other fields beginning to fall below critical mass are arthritis and rheumatism, gastrointestinal diseases, lung diseases, kidney diseases and dental research. At the National Institute for Medical Research the Council has been unable to fund important initiatives in developmental neurobiology, protein crystallography and leprosy—all areas singled out for expansion, funds permitting, when the director was appointed. At the Laboratory for Molecular Biology the Council has been unable to provide the additional resources which are needed to take forward a number of developments—including NMR spectroscopy, RNA chemistry, regulation of gene expression and electron-spray mass spectrometry. At a macro-level the MRC remain committed to the objectives set out in the Corporate Plan (about to be published) which may be summarised as:

20 March 1991]

[Continued

- To continue to develop research in basic biological science.
- To strengthen clinical research.
- To respond to the UK's health needs.
- To continue to maintain a portfolio which reflects the needs for different kinds of research activity:

Basic and applied

The Council is responsive on the spirit of creative enquiry and at the same time recognises and fulfils the requirements of those who provide and use the health services and those who seek to carry results through into industry and commerce.

Different fields of science

The Council has a responsibility for all areas of medical and related biological research. Because of the inter-dependence of the various scientific fields it maintains as comprehensive a coverage as possible.

Research involving differing degrees of risk

Research demands not only critical enquiry and diligent investigation but also a measure of speculation. The Council must maintain a mix of research activities within which three main distinctions which are not mutually exclusive may be drawn.

Speculative investment whether short or long term where the probability of a success may be low but where the scientific rewards will be high if a breakthrough occurs.

Work which through a series of small incremental steps logically extends earlier.

Work often over a long timescale and where the risks are lower because information is available on past achievement.

Research specifically intended to meet a practical need (e.g., collection of epidemiological data development of an assay) or to deliver results which may have immediate practical use (e.g., clinical trials, pre-development collaboration with industry).

CHANGES TO THE DUAL SUPPORT SYSTEM

1. What is your view about the proposed changes to the Dual Support System?

The MRC is broadly in favour of the proposed changes in responsibility for funding research and the associated transfer of funds from the UFC to the Science Budget. The changes should ensure both that the full costs of undertaking research are recognised and that those conducting the research will have a more clearly stated (and costed) claim on the resources to be made available by their Institution. This should lead to a more focussed and effective use of scarce resources although it is important to recognise in any analysis that the total volume of resources available for university research through the UFC and the Research Councils will not increase as a result of the transfer. Thus it will do nothing to address the problems intrinsic to underfunding of the science base.

What will be the impact of the transfer of money from the UFC to the Research Councils on:

(i) *Teaching*

The MRC is not in a position to comment with authority but cannot identify any significant net impact. However, if the distribution of research resources between Institutions and between Departments within Institutions were to be affected as a result of the transfer there could be knock-on effects on teaching.

(ii) *Research Council funded research*

As the general view already expressed will indicate the MRC believe that the transfer will ensure that the full costs of undertaking Research Council funded work will be more clearly identified and that at both Departmental and individual researcher level this will provide a closer and stronger claim on University resources. That must serve to ensure that the research will be more effectively prosecuted and greater accountability introduced.

(iii) *The capacity of Higher Education Institutions to maintain the "floor" of research capability enabling speculative ideas to be explored*

The capacity must already have been affected by the general financial position and overall amount of resources available for distribution by the UFC. Again the MRC cannot comment with authority but sees no reason to suppose that the proposed transfer will have any significant net impact. Nevertheless this is a key area and it will be important to ensure that the Universities' and the Research Councils' capacity to respond to speculative ideas is not diminished.

20 March 1991]

[Continued

2. Will the new system accelerate the *de facto* emergence of research-based and teaching-based Universities?

Clearly the new system will have the potential to redistribute resources between and within the Universities. The UFC will presumably retain a system which distributes remaining UFC research resources on an at least partly selective basis. It seems inevitable that the end result will be that resources will become more focussed into selected centres and departments. That does not necessarily accelerate the emergence of two quite separate categories of University but could certainly affect the range and depth of research-based activities supported by an individual University.

3. What problem do you envisage with the new system? To what extent is it possible to make an adequate estimate of research overheads?

There will inevitably be a number of teething problems associated with the new system but there is no reason to suppose that they cannot be overcome during the transitional period. The main problem is likely to be what would be an unrealistic expectation that the transfer will solve the general problem associated with chronic under-funding of research in the Universities. Given that the total volume of resource currently allocated by UFC/RCS remains the same—and there can be no reason to suppose otherwise—those general problems will remain. To the extent that the new system allows a successful grant applicant guaranteed access to a larger volume of committed resources than the present system does the applicant will regard it as a successful new system; but the inevitable price will be that somewhere else in the system something will have to give. On one scenario this could result in a smaller number of more adequately funded grants; on another scenario it could result in other University activities—which might have enjoyed funding under the old system—going under-funded or not funded at all. One area which may pose particular problems is the funding of major departmental equipment. A joint study between the Research Councils and the Universities (with DES involvement) is currently examining how “research overheads” should be identified and costed under the new system. Current evidence suggests that although not without difficulties a workable and effective consensus will emerge.

4. What are the advantages and disadvantages of the new system?

Already covered in large part by the answers already given. Nothing substantial to add.

21 February 1991

Written evidence from Sir William Mitchell, CBE, FRS

As someone closely involved for five years, may I add to the current discussion on research funding. Apart from the level of funding—on which I comment later—there is a key underlying problem to the whole issue. The time constant of research programmes is *at least* three years, while funding “*de facto*”, via the Secretary of State’s decisions of allocations to each Council, is on an *annual* basis. No amount of rhetoric can obscure that fact and the situation is not conducive to the most cost-effective use of public funds.

Those in charge of funding agencies are caught between two extremes—either, one does nothing significantly innovative in case one over-commits beyond a single year, or in the interests of excellence in research and the ability of scientists and engineers to achieve it, one is forced to over-commit. Government has never been willing to provide planning figures for the second and third years of the PES process which will sustain the programmes it has responded to in the first year. To anyone charged with a specific responsibility for research but who wants to achieve that as cost-effectively as possible, some degree of over-commitment is necessary because of the mismatch of timescales; it is a matter of opinion whether that is reckless.

I believe strongly in the overall need to control public expenditure. The Science Vote has contributed its share to that, and the GDP proportion of public funding of civil research is now lower than that of most comparable countries, especially of France and Germany as demonstrated by Dr H H Atkinson and his colleagues in their recent report.

Nevertheless, even with a smaller proportion, there is a continuing need for rigorous attention to be given by a Council to the effectiveness of expenditure on particular projects, large and small, domestic and international. The management of funds HEI has improved significantly, while on the international front the UK has had noteworthy success. Both in relation to CERN and ESA, UK Ministers, supported by the scientists involved, have played decisive roles in improving the cost-effectiveness of those organisations: indeed the ESA result was triggered by the present Secretary of State.

In the specific case of SERC its authorized expenditure in 1990-91 was £450 million. It is believed that 2 per cent extra was included for 1991-92 at the time of the 1989 PES announcement (i.e., one year ago) to

20 March 1991]

[Continued]

meet the 1991-92 inflation. SERC accepted that it should make 1.5 per cent efficiency saving each year and estimated that, in order to sustain its programmes without an increase in volume and fully consistent with Treasury guidelines, it would need £29.5 million or 6.5 per cent. It has to be appreciated that "sustaining" is a dynamic process and includes *new* programmes to the value of about £55 million, being one-third of the grant expenditure re-allocated each year. Indeed it was hoped that a programme on "Clean Technology" could be started by these means.

At the end of the 1990 PES process I understand that the Secretary of State has allocated £12 million to the SERC, i.e., 2.7 per cent, a shortfall which exacerbates the annual funding dilemma already referred to. The consequences of not funding a significant part of the £29.5 million were made entirely clear to the DES in May 1990 in a letter from me, and a clear indication was given of the steps needed to cope with increased costs if there were to be a budget in which inflation was inadequately recognised. There is no sudden mystery. Programmes can always be cut, but to curtail activities so recently started, with the increased funding made available in 1989 and 1990, is a bizarre way of going about things.

International subscriptions are often said to be the major cause of all the problems. The ABRC in its advisory Strategy Document spoke of the need to foster international collaboration where excellent scientific programmes were costly for the UK. This is clearly right but there are consequential commitments which are related to relative GDP performance, by the international rules. Given the proper scientific assessments which both lead to joining an international collaboration and to the continuing reviews of performance, Government should not force out of the (*less than GDP related*) *domestic funding* the money needed to provide for the legally required *GDP related international funding*.

CERN is frequently quoted as a specific case. CERN is not cheap; if the subject it pursues were, the work could be done nationally. It is the most successful international scientific collaboration the world has seen, and its scientific achievements relate fundamentally to the origin of matter and have given Europe a world leading position. This is a source of pride to many including those, like myself, not involved in the subject, just as other world-leading discoveries in any science, whether big or small, are a source of legitimate pride. Since 1984-85 the cost of the CERN subscription to SERC has been:

	UK/ CERN million	SERC Total	Proportion per cent
1984-85	£35.507	£277.866	12.78
1985-86	£37.881	£298.534	12.69
1986-87	£44.750	£316.735	14.13
1987-88	£55.975	£357.479	15.66
1988-89	£54.105	£365.274	14.81
1989-90	£48.865	£406.70	12.01
1990-91	£54.093	£450	12.02

The increase after 85-86 was connected with the fall in the value of sterling, while the decrease after 87-88 reflected the beneficial effects to the UK of the Abragam Review. The figures for 1990-91 (of which £1.5 million was postponed until 1991-92 for cash flow reasons) showed a significant increase on the occasion of the new relative GDP calculation which reflected the relatively favourable UK performance in 1987-89. The *estimated* subscription for 1991-92 is £56.327 million (estimated 12.1 per cent), the increase arising from Swiss inflation (it exists but is lower than here) and a 2 per cent volume increase, the first in CERN for many years, which nevertheless we opposed. Exchange rates have not been a major factor; on the other hand it is absurd that the Council's domestic funding, unrelated to GDP, should underwrite the GDP related calculation of subscription as it had to in 1990-91. Regarding 1991-92, if the full £29.6 million had been granted there would have been no new problem with the CERN subscription.

On another matter, your readers may not be aware that a record number of graduate students was funded by SERC in October 1990, comprising normal research students, co-operative awards with industry higher than for many years, and one year studentships including ca. 1000 on IT related courses for industry. Council had given the highest priority to manpower training, a policy which it has made very public. These people will come into employment in one, three and four years from now. It is a reasonable bet that by that time Government policies will have improved the economic situation and these young scientists and engineers will be desperately needed. Manpower planning is a minefield and to be avoided; but a Council can show common sense even when this involves a forward commitment which, however, is only reckless if it is thought that Government policies will not succeed.

There are many dimensions to all these issues and I do not pretend to be comprehensive in this brief article. I have tried to explain the intrinsic problems which funding agencies face. There are other problems such as funding major capital items out of recurrent expenditure and, of course, the relatively low level over the last few years of industrial expenditure on civil research. Government is right to encourage an increase from

20 March 1991]

[Continued

industry, but that does not gainsay the fact that public spending on civil science is falling further behind those of France or Germany, however one compares it. I for one do not see that this increasing gap should be the norm; scientists and engineers should focus on this sorry state of affairs rather than be deflected into internal funding.

Written evidence from the Natural Environment Research Council

RESEARCH COUNCIL FUNDING

1. To what extent are research councils' current financial difficulties the result of:

- (i) *The overcommitment of resources and, by implication, poor financial or strategic management on the part of research councils.*

Response:

NERC has not over-committed its resources. The Council operates a formal Corporate Planning process and there is a close relationship between the strategic planning of Council's corporate objectives and the allocation of funds to the resulting activities. In the course of its financial planning NERC strives to make realistic predictions of inflation and take its effects into account.

The broad framework of activity is published in the NERC Corporate Plan (1990 Plan enclosed, 1991 Plan in print). An operational plan providing detailed financial information on a programme-by-programme basis using specific inflation assumptions is provided in a confidential five year Forward Look document to ABRC.

- (ii) *The failure of government to make an adequate allowance for increased salaries:*

Response:

The government has made *no* specific allowance to NERC for increased academic salaries. The cost of such salaries falls upon NERC in relation to research grants to higher education institutions (HEIs) and NERC units within HEIs, and must be contained within Council's financial planning. In the longer term this could mean that, for example, the volume of research grants awarded will decrease, or that the same volume can only be supported for a shorter period of time, unless NERC obtains additional funds for this purpose in future years.

It should be noted that NERC also has to budget for increases in the salaries of its own staff. As with academic salaries, NERC has no influence on the size of those increases and receives no special allowance for them.

The main difference in allowing for these salary increases within our financial planning is that there is often a much greater time lag in agreeing academic salary awards and accurate figures are not available at the correct time within the cycle.

- (iii) *Increases in subscriptions to international projects.*

Response:

NERC has a relatively low level of international subscriptions, <£2 million pa, mostly related to membership of the Ocean Drilling Programme. This commitment is not a major problem.

NERC's involvement in international projects generally is by direct participation through contributing to nationally funded programmes, rather than by financial subscription. This type of involvement, which is a feature of environment programmes, can be tailored more easily to fit changes in available resources.

- (iv) *The failure of budgetary increases to keep pace with inflation.*

Response:

As a result of the 1990 Public Expenditure Survey (PES) NERC gained an additional £2.3 million, raising its 1991-92 allocation from the Science Budget to £122.6 million an increase of 1.9 per cent. This will be insufficient to cover inflation in 1991-92 forecast at 6 per cent by HM Treasury. However, NERC received significant additions to its Science Budget in 1988 and 1989 PES which are still feeding through into the allocation.

Problems will occur in areas within NERC which have not benefited from these awards but in general NERC expects to be able to manage its finances without major reductions in its present programmes or Corporate Plan objectives for 1991-92. The ability of NERC to sustain this position beyond 1991-92 will depend on the award of additional funds at not less than the prevailing rate of inflation. If such additions are not forthcoming NERC will have to curtail or stop planned programmes.

- (v) *The difficulty of terminating projects.*

Response:

Much of NERC's research, both in its research institutes and supported in HEIs, comprises projects and programmes which have a finite, usually three to five years, life. Termination gives problems only when it is premature and the financial costs of staff redeployment or redundancy are incurred.

20 March 1991]

[Continued

The Committee will be aware that NERC has already had to address the difficulty of terminating projects and staff employment. Where new projects require new skills, staff redeployment is not always a possibility. As a result of previous experience, NERC has increasingly looked to the use of limited period appointments where appropriate as a way of maintaining some flexibility.

(vi) *Any other reason*

Response:

A significant part, about £39 million, of NERC's budget is constrained by the government's policy on the British Antarctic Survey and the British Geological Survey. These funds are effectively earmarked within the Science Budget and so significantly reduce NERC's internal financial management flexibility. Earlier redundancies (see above) have resulted in an increased commitment to pensions. Any further redundancies will further increase this non-deployable element of the budget.

2. What is your view about your Research Council's budget allocation for 1991-92. What difficulties do you envisage arising out of this allocation, i.e., will it constrain your activities in any way or lead to the untimely end of projects?

Response:

The level of the allocation for 1991-92 is disappointing. This is particularly so in view of the emphasis given by the Government in its Environment White Paper to the need for a strong base for environmental research and understanding to underpin environmental decision making, and the high profile given to NERC research in this White Paper.

The additional funding granted in 1991-92 will allow NERC to support only 40 per cent of its highest priority new science programme, the Terrestrial Initiative Global Environmental Research. There will be no additional support for a number of other high priority programmes such as the British Mid-Ocean Ridge Project, the Arctic research initiative and the AUTOSUB project. Some existing laboratory research projects will be prematurely terminated.

3. The Secretary of State considers that the science budget for 1991-92 "provides the basis for the continuing development of the country's science base" (HC Deb 9 November 1990 cols 29-30). Do you agree?

Response:

It would not be appropriate for the NERC to comment on the Secretary of State's statement.

4. What is your most pressing financial problem?

Response:

NERC's most pressing financial problem is maintaining the infrastructure needed to support a sound base of high quality science across the wide range of disciplines needed to make progress in research on important environmental issues. Resources have to be found for such infrastructure, which includes provision for well-found laboratories in research institutes and the HEIs, support services and facilities for use by the whole research community, and trained manpower.

5. Will the present financial difficulties lead you to reconsider the balance of your portfolio?

Response:

The NERC portfolio for 1992-93 onwards will be reconsidered as part of the planning process. It will most probably have to be reduced if adequate additional funding is not forthcoming from the 1991 PES settlement and in future years. This is forecast in NERC's 1991 Corporate Plan.

CHANGES TO THE DUAL SUPPORT SYSTEM

NERC supports the current limited transfer of money from the UFC to the Research Councils on the grounds that this will assist in the fuller identification and recovery of costs associated with Research Council-funded grants. NERC is contributing to the joint Heads of Research Councils (HORCs)-CVCP study into the mechanisms and scale of the proposed transfer. A number of the questions posed by the Committee will, at least in part, be responded to as a result of this study which is due to report, to the ABRC, in April 1991. It is expected that further studies will be carried out after April which will explore in more detail specific impacts on the HEI system.

20 February 1991

*20 March 1991]**[Continued]*

Written evidence from the Polytechnics and Colleges Funding Council

INTRODUCTION

1. The Council appreciates the invitation to submit written evidence to the Select Committee's short investigation of the Science Budget for 1991-92 and its consequences. No comments are made on those questions relating specifically to Research Council funding. This response deals only with matters relating to the proposed changes to the dual support system.

THE PCFC SECTOR

2. There are 31 polytechnics and 53 colleges with the PCFC sector. In 1988-89 these institutions provided for 60 per cent of the total higher education students in England, the other 40 per cent being provided for by the universities. In PCFC institutions half of the provision is in full-time and sandwich degree courses and 35 per cent of students are on non-degree courses.

3. In the current academic year over 40,000 students are enrolled on courses in science leading to degrees or diplomas. Demand for science courses is strong and in each of the last two years enrolments have increased by over 10 per cent.

RESEARCH IN THE SECTOR

4. The role of research in the polytechnics and colleges was outlined in the Secretary of State's letter of guidance to the Chairman of PCFC (31.10.88):

"The mission of the polytechnics and colleges in research is properly centred on applied research of relevance to the needs of industry and other end-users who pay for it. Along with this, some institutions may usefully engage in strategic research in particular fields in which they have established expertise related to their applied research. The Government does not however intend to provide funds for the support of basic research in polytechnics and colleges."

The Council recognises that the scale of research in the institutions it funds cannot be expected to equal that in many universities. It commissioned a detailed enquiry into research in the sector last year by a specialist committee of distinguished scientists led by an independent chairman. (A copy of the report is enclosed.)

5. The committee found that there is a vigorous, distinctive, varied and growing research activity in almost all polytechnics and many colleges. The study indicated the level of expenditure on research to be about £80 million in 1988-89—£50 million of which was contributed mainly by industry and commerce. Just under £7 million was awarded from the Research Councils.

6. There is no dual funding of research in the sector as exists for all universities.

CHANGES TO THE DUAL SUPPORT SYSTEM

7. The Council considered its response to the proposed changes to the dual support system at its meeting in April 1990. The Council believed that the dual support system as then constituted was inconsistent with broad government policy in two respects.

- (a) Accountability: there was no procedure to determine whether all the research funds allocated to universities are spent on research; and
- (b) Reduced scope for competition on merit: by its nature UFC research funding is confined to the universities and is not open to competition on merit from other higher education institutions, which it would be if the funds were allocated by the Research Councils.

8. Consequently, the Council welcomed the proposal to transfer responsibility for funding all the costs of research grants to the Research Councils as providing some clarification on the funding responsibilities of the Research Councils and the higher education institutions. In doing so, however, the Council considered that the proposals fell short of providing an optimum basis for allocating funds and would wish for further progress in this direction for applied and strategic research.

9. The current proposals involve the transfer of around £100 million in a full financial year from the UFC to the Research Councils. This means that even after the transfer, all universities will continue to benefit from access to approximately £670 million of publicly funded support for research that is not available to, nor open to competition from, PCFC institutions.

20 March 1991]

[Continued

THE COMMITTEE QUESTIONS

10. Turning to the specific questions raised in your letter:

(1) View about the proposed changes:

The changes are welcome in so far as they go;

(i) Impact on teaching;

Research has undoubted benefits on the teaching function but as the transfer of funds from the UFC to the Research Councils is financially neutral the overall effect on teaching should be nominal;

(ii) Impact on Research Council funded research:

Since the transfer allows greater competition, it could improve the level and extent of Research Council funded work;

(iii) Impact of Higher Education Institutions' capacity to maintain the research floor:

PCFC institutions have never been put in funds for this purpose;

(2) Emergence of research-based and teaching-based universities:

The scale of the proposed change is unlikely to bring about any significant new change of direction. The increased proportion of funds allocated in accordance with research grading (i.e., JR element of UFC funding) and the concentration of research council funding is already resulting in the emergence of some universities which are largely teaching-based. It is an increasing cause of concern to polytechnics that universities such as these should continue to be supported for research purposes through the dual funding route (i.e., the SR element of UFC funding) when the polytechnics are required to support their research entirely from within their general grant, supplemented by external earnings;

(3) Problems envisaged with the new system:

No significant problems are anticipated;

(4) Advantages/disadvantages of the new system:

The Council would see an advantage in the extent to which the changes will provide increased opportunities for polytechnics to compete for research funds. The limited extent of the funds available for competition will continue to be seen as a disadvantage.

Written evidence from Christopher Price Esq, Director, Leeds Polytechnic

I write as a former Chairman of the House of Commons Select Committee on Education, Science and the Arts, which examined the Science Budget and its administration in the early 1980s. I realise that you have already called evidence on this subject and this memorandum comes late. I hope nevertheless that the Committee will be able to receive it.

I have read the evidence from the Committee of Polytechnic Directors and I agree with the criticisms in it of the present system of funding. What I append below is a possible solution to the problem of the gross disparity in treatment between universities and polytechnics, which I hope may help you in forming your recommendations. It introduces the concept of a 'research mission', the scope of which could be agreed for each university, polytechnic or college by the funding councils. Because the current spectrum of research activities by institutions is very wide, the scope might vary from over 50 per cent for some universities to 0 per cent for many colleges. The proposal, however, is cast in a framework which approaches the problem of research in higher education from a holistic standpoint on the grounds that both Funding Councils are due to move to the same building in Bristol in June with a view, it is commonly assumed, first to early amalgamation and then rapidly to a system which provides to each institution on common principles.

"Research resources come from a variety of sources. There should always, however, be an element of core funding in the science vote to underpin an agreed element of research in certain institutions of higher education.

Institutions' involvement in research already varies widely and will continue to do so. All universities, polytechnics and colleges, however, now present institutional development plans to their funding councils, which include a statement of their view of the scope of their research mission; these missions are normally based both on their existing research and on proposed developments.

Along with the existing mechanisms developed by the UFC and the PCFC, these development plans and the research missions within them, enable judgments to be made about equitable distribution of available resources for underpinning research and greater accountability for their use. The Government should ensure that institutions receive adequate core funds for research on the basis of the scope of their research mission as agreed between the institution and its funding council."

Letter to the Clerk from Professor Brian Ray, Coventry Polytechnic

I am responding on behalf of Coventry Polytechnic to your invitation to Polytechnics and Universities for written evidence on the Science Budget 1991-92.

The response is structured in the form suggested.

20 March 1991]

[Continued

RESEARCH COUNCIL FUNDING

1. (i) The current financial difficulties are related to a number of causes a major one of which is the inadequate inflation allowance made by government to the Research Councils.
- (ii) The impact of this is that salary settlements in Universities and Polytechnics, which are determined independently of the Science Budget, have exceeded that inflation rate; research staff rates are linked directly to academic salaries.
- (iii) Subscriptions to international projects again have in the main outpaced inflation causing further mismatch between available resources and existing demand levels.
2. (i) The allocations in 1991-92 from the Research Council's budgets are likely to diminish both in the context of grants and studentships because of the higher competition for the smaller amounts of money available.
- (ii) It is particularly distressing to the Polytechnic sector, which has progressively made inroads into the Research Councils allocations without the benefit of dual funding. The latest reported SERC figures give Coventry Polytechnic £1.46 million in current grants, being in the top three of the Polytechnics, and above a significant number of Universities. One can foresee this achievement being eroded in 1991-92 and subsequently with contractions of the Science Budget.
3. The proposed Science Budget for 1991-92 is unlikely to provide the basis for continuing development of the country's science base. The EC has proved to be a saving grace for many Polytechnics and we shall be looking to Europe for more support.
4. The most pressing financial problem is providing the infrastructure for research and ensuring that a number of key projects that have received high SERC rating are funded by some other means.
5. Inevitably there will be a shift in the balance of work to more short term programmes supported by industry and commerce but the present economic climate is not ideal for this to happen. Further, short term work, if sustained over too great a period, leads to an erosion of the basic research capability to undertake such applied work.

CHANGES TO THE DUAL SUPPORT SYSTEM

1. The virtual absence of a dual support system in the Polytechnic sector makes the shift of money from the UFC to the Research Councils highly desirable. It will allow competition for Research Council funding to be made on a more equitable basis.
2. Inevitably there will be an emergence of predominantly research-based and teaching-based HEIs. This will allow a conscious choice on the part of HEIs as to the particular type of institution they would wish to be. Given equality of treatment there will be a fair proportion of the Polytechnics that will be substantially research-based.
3. There will be teething problems in identifying appropriate overhead levels but beyond that no very significant problems are anticipated for the Polytechnic.
4. The advantages of the new system will be a much greater recognition of the full costs of research and fairer competition for funds. The major disadvantage is that further transfer of funds from the UFC to the Research Councils have not been proposed, so that the true full cost of research, including staff time is covered.

I trust that the above comments will be of assistance to the select committee's deliberations.

Your sincerely

Professor *BRIAN RAY*
Assistand Director

Written evidence from Dr D H Roberts, Provost, University College, London.

INTRODUCTION

Many bodies have presented excellent evidence concerning the chronic underfunding of UK science relative to our international competitors and EC partners. What makes the current problem, acute is:

- (i) The inadequacy of funds available to the Research Councils in the current PES round to meet their existing commitments.
- (ii) The breakdown of the so-called dual-support system with the decline and inadequacy of the "DR" element in UFC funds.

20 March 1991]

[Continued

- (iii) Whilst not directly related to the problems of the Science Budget, the above problems will be further compounded by an academic staff pay review which is underfunded by the UFC and Research Councils, as a result of HMG policy.

I will now concentrate on (i) and (ii) above.

RESEARCH COUNCIL FUNDING

There are three main problems:

- (i) Years of decline in true "reals terms", in spite of claims to the contrary by successive Secretaries of State.
- (ii) Levels of funding for science which compare unfavourably with our international competitors as shown in "British Science: Benchmarks for the year 2000" published by the Save British Science Society.
- (iii) The impossibility of sensibly planning long-term research programmes given the instability of the annual PES round. Pegging the Science Budget to a fixed percentage of GDP (preferably the same as that in Germany) is what is needed.

THE DUAL SUPPORT SCHEME AND "DR"

There are three problems:

- (i) Work being carried out to identify the level of indirect funding which would have to be supported by Research Councils, once the DR cash is transferred to them from the UFC, shows that the historical "40 per cent" DR is frequently, if not always inadequate in universities and departments with a high ratio of research to teaching (see (iii) below).
- (ii) This problem has been compounded by the erosion of DR from 40 per cent to 33 per cent over the last two years. To illustrate, this costs UCL £1.4 million loss of what was already inadequate funding of indirect (but essential) research;
- (iii) The only way in which volume of research is taken into account is through DR, and this is as a fixed add-on (33 per cent currently) to research grants. In practice it is clear that this constant 33 per cent does not reflect the reality as you move from a teaching dominant to a research dominant department/cost centre/institution. In the teaching dominant case, very little (frequently zero) incremental indirect costs may be incurred (but such departments still get the DR), whereas institutions with research-dominant departments have to cope with step-function increases in indirect costs for space, laboratory facilities, technical infra-structure etc.

This distinction between the relationship of Funding and Expenditure with the ratio between research and teaching is illustrated in the attached figure.

CHANGES TO THE DUAL SYSTEM

One major advantage and two dangers and one big residual uncertainty flow from the proposal to transfer DR funds to the Research Councils.

- (i) ADVANTAGE: the analysis of indirect costs which is currently being carried out will demonstrate historical inadequacy of DR and the degree of underfunding of research and teaching in combination.
- (ii) DANGER I: neither the Research Councils nor the UFC seem to have accepted the responsibility of funding buildings/maintenance for research purposes.
- (iii) DANGER II: the deficiency in the current DR system as outlined above will be further compounded when indirect support is on a per project basis with no recognition of the impact of scale and hence no mechanism to address the needs of our major research-orientated institutions. This runs counter to all the expressions of intent to concentrate research resources in Centres of Excellence.
- (iv) UNCERTAINTY: what is planned for the dual support of research funded by UK charities in the future?

COMMENTS ON FIGURE

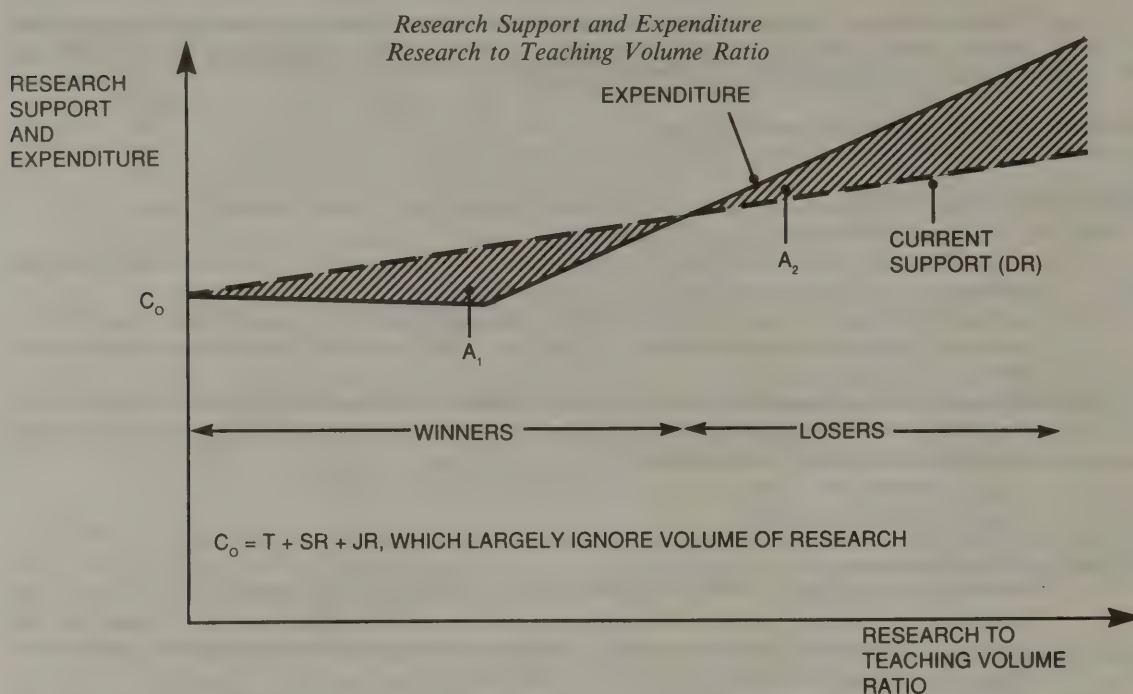
- (i) Support Curve is current DR practice.
- (ii) Expenditure Curve is closer to reality.
- (iii) Change of methodology can be financially neutral nationally by ensuring that areas A1 and A2 are equal.

CONCLUSIONS

If the DES/UFC/ABRC are concerned about the future financial health of the leading UK research universities there should be a serious re-analysis of the methodology for providing indirect cost support. This is independent of the arguments in favour of increasing the taxpayers' funds available to the whole system.

20 March 1991]

[Continued



I recognise that such a transfer of funds via the introduction of a volume-dependent indirect costs multiplier is not likely to happen: too many institutions will object. However, this does show the inconsistency between policy statements, on "excellence" and "concentration of research", and funding mechanism. This nettle must be grasped as part of the discussion on the transfer of funds from the UFC to the Research Councils.

Dr D H ROBERTS

Provost

University College London

February 1991

Written evidence from the Royal Society

I. INTRODUCTION

We are pleased that the Select Committee has decided to investigate the 1991-92 Science Budget, and welcome this opportunity to contribute to its deliberations. In view of the short time available for responding, we can do no more than highlight one or two points. We may wish to return to some of these in more detail on a later occasion, for example in connection with our Science Inquiry.

The Science Budget is one element in the UK Science Base (the research carried out in HEIs and Research Council Institutes), and needs to be considered in that context. Our submission will therefore focus on three issues:

- Developments in the Science Base up to 1990-91.
- The impact of the 1991-92 settlement on the Science Base.
- The dual support system.

II. DEVELOPMENTS IN THE SCIENCE BASE UP TO 1990-91

In the period to 1990-91, Science Base expenditure has grown quite substantially in real terms. However, the relations between the various elements of the Science Base have changed. For example, while DES funding of the Science Base (through the Science Budget and the UFC leg of the dual support system) has grown less than 1 p.a. since 1981-82, non-DES sources grew at a rate of 8.6 per cent p.a., and by 1988-89 (the latest year for which data are available) constituted nearly 30 per cent of total Science Base funding. Moreover, the structure of the DES funding has changed. 50.5 per cent of DES support for the Science Base was channelled through the Science Budget in 1981-82, and 57.7 per cent in 1990-91.

The amount of money that the research councils have been spending directly in universities in the form of research grants and contracts (as opposed to, for example, studentships) has been growing by 5 per cent p.a. in real terms since 1981-82. However, the other leg of the dual support system—UFC money going to research—had declined since 1981-82: indeed, between 1987-88 and 1990-91 it declined by 12 per cent in real terms. This has set up severe strains in the dual support system.

20 March 1991]

[Continued

Although DES expenditure on the Science Base has increased in real terms, national wealth has increased much faster. As a percentage of GDP, DES expenditure on the Science Base declined from 0.33 per cent in 1981-82 to 0.28 per cent in 1990-91.

III. THE 1991-92 SETTLEMENT

The DES claim that the 1991-92 Science Budget represents level funding is sustainable only if (i) inflation for 1991-92 *averages* 6 per cent over the whole year and the costs of scientific research follow the pattern of GDP inflation, and (ii) some items of capital expenditure incurred in 1990-91 are removed from the baseline. It is unlikely that the 1991-92 Science Budget will support the same volume of research as 1990-91.

Individual research councils will, no doubt, be commenting on the impact of the 1991-92 settlement on their own activities.

It is difficult to obtain a clear picture of how much the PES settlement will allow to be spent on research by universities from general public funds (i.e., UFC block grant plus fees for home students). The outcome will depend on, *inter alia*, how individual universities decide to meet the costs of teaching rapidly growing numbers of students. However, it is likely that the sum spent in 1991-92 will support a volume of research no greater than in 1990-91.

Two other structural features of the way the Science Base is supported are relevant here. One is the annuality rule, which severely limits the amount of money that can be carried forward from one year to the next. This is an unnecessary impediment to flexible management of resources. More generally, the current practice of giving clear budgets for only one year ahead (and that with only three months' notice), and indicative figures for only two further years (typically with wholly unrealistic assumptions about future rates of inflation), is incompatible with the time-scale of scientific research. This is not just a problem for international subscriptions or major facilities that obviously require long-term commitments. "Ordinary" research grants typically last three years, and are preceded by a year of planning. Projects that involve collaboration with other partners, particularly overseas partners, to an even greater extent need security of funding. Funding agencies are having to make firm commitments to their clients for periods longer than the Treasury is prepared to make firm commitments to them. This cannot be in the interests of efficient management.

The second structural feature concerns pay rises. For some years the DES has adopted the practice of approving pay settlements for academic staff but providing insufficient money to cover them. The shortfall has to be made by "efficiency gains" and/or, increasingly, by reducing staffing levels. This practice erodes not only the Science Base itself but also academics' confidence in the goodwill of the DES. Moreover, the Science Budget agencies (research councils, Royal Society, Fellowship of Engineering) are not involved in academic pay negotiations, even though a substantial part of their expenditure is linked to rates of academic pay. This, again, frustrates good management.

IV DUAL SUPPORT SYSTEM

The Royal Society is greatly concerned about the future of the dual support system, and we are examining a number of aspects in detail. Here we simply draw attention to some matters of principle.

The proposed changes to the dual support system are intended to be neutral with respect to the amount of money supporting scientific research in universities. It is *essential* to ensure that this is indeed the case, however difficult that might prove in practice.

Other key points are:

- (i) To define precisely what the money transferred to the ABRC agencies is supposed to pay for, and to ensure that the amount actually transferred is sufficient to pay for it.
- (ii) To define precisely what the money left in the UFC leg of the dual support system is supposed to pay for, and to ensure that the amount actually left is sufficient to pay for it (without fudging the cost of discharging universities' other functions).
- (iii) To monitor the volume of university research supported by the ABRC agencies.

V CONCLUSION

All the above points to the need for better linkage between the various parts of the UK Science Base. We therefore recommend that the Select Committee, in examining the Science Budget, look also at other features of the Science Base, particularly the underpinning of research carried out in HEIs.

Written evidence from Save British Science

A detailed analysis by SBS of the recent science budget figures is given in "Notes on the Government Funding of science" (referred to below as Notes) and our proposals for an overall, long-term policy for investment in science in the UK are set out in "British Science: Benchmarks for the Year 2000" (referred to as Benchmarks). Both papers are available to the Committee.

*20 March 1991]**[Continued]*

In this memorandum we comment on some of the questions raised by the Select Committee in their announcement of 12 February, and on related matters not touched on in the other two papers.

1. RESEARCH COUNCIL FUNDING

The recurring financial crises suffered by the Research Councils (RCs) are a consequence of more than a decade of chronic under-funding of the science-base by government, both through the RCs and via the UGC/UFC leg of dual support. The effects are cumulative: on the availability of front line equipment, the adequacy of the infrastructure, and the living standards and career prospects of research staff. The science-base cannot be expected to continue its outstanding performance, in most areas of science it has been second only to the USA, without the effects of inadequate support eventually becoming evident. Recent publication and citation analyses (*Nature*, 7 March 1991) suggest this may now be happening.

The potential for discovery and technological innovation has seldom, if ever, been greater. But instead of making the most of these opportunities by nurturing the British talents for science government complacency and neglect has allowed the pace of advance increasingly to be set by scientists and engineers in other countries, supported by the more enlightened policies of investment in science adopted by their governments.

- 1.1(i) Inadequate funding coupled with the absence of conditions allowing reliable forward planning (the RCs often do not know their budget until almost the beginning of the financial year) have compounded the RCs difficulties in financing research at a time which has seen significant changes in the ways research is conducted. Much, but not all, of present day, "small science" would have been considered "big science" not so many years ago. Expensive pieces of apparatus are shared by several scientists and their assistants working in teams, perhaps needing access to a large national, or even international, facility.

Thus many research programmes necessarily involve long-term commitments, to rolling-programme grants, IRCs, national facilities, and of course international subscriptions. Government is a party to these programmes and must accept a share of the responsibility in financial management for them. It cannot ignore the arbitrarily damaging consequences of failure to meet rising costs which are not controlled by the RCs, and the often devastating impact on the portion of "free-money" available each year for new grants, especially those for individual scientists and small groups.

- 1.1(ii) Failure to meet salary increases is a major factor, particularly since the universities have been unable to fund the growth of research teams and the costs of employing short-term research staff has fallen on the RCs. It is not that the salary rises have been excessive, indeed the reverse is the case. Young scientists have been prepared to accept salaries which have fallen behind the average for non-manual workers, and so in effect have been contributing from their own pockets to the other costs of research. But here also there are danger signals, as increasing difficulties are experienced in attracting graduates into research (see SBS evidence to the House of Commons Select Committee on Education, Science and the Arts, First Report, 18 December 1990).
- 1.1(iii) The responsibility of government as a partner is particularly clear in the case of international subscriptions by treaty. It is sensible that costs in very expensive areas of research should be shared with other countries. The total expenditure on international subscriptions is just over £100 million, of which about £56 million is for CERN, out of a total science budget of about £900 million. The stubborn refusal of government to protect the domestic research programmes from sterling increases in international subscriptions must be condemned; the failure is unique in Europe, serves no essential purpose, and often causes severe damage to unrelated research, especially the funding of new grants because this comes from un-committed monies. We do not ignore the necessity for control over expenditure, including international subscriptions, and return to this point later.
- 1.1(iv) We discuss the failure of budgetary increases to keep up with inflation in the Notes. Here we draw attention to three points: (i) the science budget for next year does not keep pace with inflation or, if the government's claim that it does is accepted, there was no increase, in real terms, last year—contrary to another government claim; (ii) the costs of front-line research rise faster than the general inflation; (iii) the policies in other countries to fund R&D at a higher, and in some cases increasing, proportion of GDP means that the gap between the level of support for science in those countries and in the UK is growing wider.
- 1.1(v) With a proper, long-term policy of investment in science there should be less likelihood of funding crises, with the need for sudden arbitrary cuts or not properly considered terminations of research programmes.

- 1.2 See Notes, and remarks above.

1.3 We do not agree with the Secretary of State that the science budget for 1991-92 "provides the basis for the continuing development of the country's science base". Our detailed discussion of this point is given in Notes and Benchmarks.

*20 March 1991]**[Continued]*

We must, however, take this opportunity to deplore the Secretary of State's decision no longer to publish the advice he receives from the ABRC. And the "explanation" that this removes an anomaly with respect to the advice from the UFC only illuminates another major deficiency. The government especially, but also the ABRC and UFC, should be accountable to Parliament and the public on the actions taken in relation to the advice given.

2. CHANGES TO THE DUAL SUPPORT SYSTEM

The main effect of the proposed transfer will be further to curtail the independent exercise of local judgment in universities in the support of speculative initiatives in research, especially by young, not-yet-established, scientists; it will increase the concentration of research in a few major universities and the national laboratories, so reducing the contacts between teaching and research which successive HMI reports on science provision in polytechnics and colleges have said are vital to successful, high quality, teaching and learning in the sciences; it is another element of the tactic to implement the RTX strategy by the "back-door". It is not the best way to introduce more "accountability" and it does not provide the polytechnics with an element of research funding independent of external committees, as the dual support arrangement used to do for the universities.

Looked at in detail the proposal is flawed even as a means to achieve the intention of giving the RCs the funds necessary to cover the indirect costs of research in the Higher Education Institutions (HEIs). The plan is to transfer the DR element of the UFC grant to the RCs. But this has remained cash-limited at £110 million for the last three years. Although claimed initially to represent 40 per cent of research income, it has never reached this value; and in 1991-92 it is expected to amount to no more than 23 per cent. Moreover, it is generally accepted that the indirect costs really correspond to at least 60 per cent of research income, as found by the Hanham report of 1988. So, if the transfer is made at the proposed level it will not achieve the stated aim of meeting all indirect costs, except academic salaries, of RC supported research; the universities will still have to meet the other two-thirds, another £200 million. If they don't then the RCs will receive demands from scientists, especially at the major research oriented universities, that they cannot meet; if the universities continue to pay rising indirect costs there will be an inevitable squeeze on teaching, at a time when everyone wishes to see student numbers increase.

There are no advantages, only more disadvantages. What is to be said to the charities—now, in medically related fields, spending more than the MRC? Are they expected to pay all indirect costs, at 60 per cent or more? If so the result will be a contraction in research; if not yet more pressure on university finance. There is an equivalent problem for research undertaken with industry and we return to this below.

The proposal is another recipe for reduced research activity. It is misconceived and has not been properly thought through.

Our suggested solutions to the real problems that exist **having first accepted the need to increase investment in the science-base along the lines of the Benchmarks paper** are to:

- (1) Revitalise dual-support with a substantial increase in the UFC grant research component.
- (2) Extend the dual-support facility to the polytechnics.
- (3) Require universities and polytechnics to report—at three yearly intervals—on the use of the funds. Continuation at the same level (in real terms), an increase, or decrease should depend on performance. This would provide true accountability.

3. CONTROL OF SCIENCE EXPENDITURE

No government is going to sign blank cheques for research, and we are not asking ours to do so. We do however ask government to adopt a clear, long-term policy for investment in science. This is not an exotic idea, many other countries have one. Our suggestions for such a policy are outlined in the Benchmarks, but in that there is no discussion of the management of science expenditure.

The first point to be made on management is that government must not only accept that it bears prime responsibility for funding the science-base, as the Prime Minister's predecessor has explicitly agreed, but also recognise that it is a party to the decisions that are made and must share in the tasks of management of such a considerable enterprise; government cannot piously "wash its hands" of responsibility when genuine difficulties occur as they do from time to time in the best run organisations. It is particularly unfair to say that certain financial problems arise from poor management, by implication making a comparison with private business when tools available to the private sector—such as bank loans and the freedom to carry forward a balance—are denied to the RCs by what appears to be a deliberately obstructive Treasury.

The objective should be to exercise adequate financial supervision and control while making sure that public funds are employed most effectively and efficiently for the intended purpose—the prosecution of scientific and technological research. We propose the following as minimum improvements on current

20 March 1991]

[Continued

practice **once the funding of the science-base is brought up to the Benchmarks level:**

- (1) Funding of the **base-line** for RCs plus the Higher Education Institute (HEI) research component should be linked to GDP on a three year rolling average, to smooth out year on year fluctuations. That is, next year's budget is determined as a fixed percentage of the average of last year's, this year's and the prediction of next year's GDP (inflation corrected).
- (2) The RCs should be allowed to carry forward up to 5 per cent of each year's grant, positive or negative, to enable more effective planning and efficient financial management.
- (3) Changes in international subscriptions should be automatically met by government using the contingency reserves whether they arise from fluctuations in exchange rates, decisions by the international governing councils of the organisations, or changes in the UK's GDP relative to other countries (the link of science funding to GDP will help to solve the latter problem).
- (4) The scientific programmes of international research organisations, continued membership, and the balance between any additional costs (resulting from point 3) and the rest of the science budget should be reviewed at five yearly intervals or when major new initiatives are proposed.
- (5) The RCs and the HEI sector can bid, year by year, for additional sums—above the GDP-linked base-line—to undertake substantial new investments or assist with other increases in costs.
- (6) The overall research programme, its quality and costs, should be reviewed regularly, say once in four or five years, with a report to Parliament, followed by renewal of the base-line funding arrangements.

4. INDUSTRY—ACADEMIC LINKS

4.1 *Levels of Industrial Support for Academic Research*

According to the Annual Review of Government Funded R&D 1990, industry met about 6 per cent of the costs of research performed in the HEIs in 1988-89. The equivalent figure for the USA in 1988 is about 7 per cent, and in the Federal Republic of Germany also 7 per cent in 1988.

In view of these comparisons it is unrealistic to expect that British industry will increase substantially its present level of funding of R&D in the HEIs. However we speculate—since the relevant information is not available—that in the UK the dominant contribution comes from the chemical and pharmaceutical industries and there is much room for improvement in the other areas, notably from electronics.

The fiscal incentives for industry to support academic research or to make donations of equipment or services are quite inadequate by the standards of other countries, and the moves discussed in the next section promise to form a significant disincentive.

4.2 *Full-cost charging*

Under pressure both to find other sources of income to make up for deficiencies in government funding, and to bring their approach into conformity with the prevailing management ethos that nothing should be done which does not show a direct monetary return, HEIs are to seek “full-cost” recovery, plus, where appropriate, a profit “that the market will bear”, for research done for, or in association with, industry.

We see this as a peculiarly short-sighted policy, looked at nationally, with consequences which may have serious impact on the improvement of the transfer of ideas and technologies between HEIs and industry, an objective which all must surely regard as a greater good than the benefits imagined above. As so often, one aspect of government policy is in conflict with another.

We have already been told by industrialists that a doubling of the costs of research in the HEI sector will just halve the amount of collaborative work undertaken. The loss will not only be counted in the projects thus curtailed or not entered, but additionally in the difficult to measure, indirect benefits—to both sides—of the informal links established that often have unexpected results of equal or greater value.

With just such considerations in mind efforts are made in other countries to foster associations between industry and HEIs, an element of subsidy being accepted as earning good value in the longterm. It is surprising that in Britain, where there is a recognised weakness in the links between industry and HEIs, an additional impediment is being introduced instead of more effective incentives.

One consequence could well be that companies, especially the multi-nationals, will quietly transfer their collaborations to institutions on the Continent, or even further afield. Such opportunities will become particularly evident after 1992. Will Continental industries seek collaborations with British HEIs?

The nation's long-term interests would be better served by providing adequate government funding for research in the HEIs and so assisting one-on-one contacts and collaborations to develop, free of the overheads and bureaucracy of special schemes and their committees.

20 March 1991][Continued

4.3 *Scientific Advice from, and to, Industry*

It has become increasingly common to find scientific advisory boards at all levels, including grant awarding committees, populated by people from industry and commerce. We welcome this as much for the experience they bring to the discussion of research policy as for the benefits to them of contact with what is going on in science. But at first sight it does present a paradox, for—with all too few notable exceptions—it is in large measure the poor appreciation of the importance of research and development by large sectors of British industry, “the City”, and the government which is responsible for the country’s declining manufacturing competitiveness. The other side of the paradox is to be found on the boards of industry and the financial institutions where the scientists and engineers of the science-base—which is arguably among our most successful enterprises in giving better value for money than will be found elsewhere—are virtually absent.

It better communication is desired between these two related areas of endeavour, a good start would be made to achieve it by correcting this imbalance. There should be at least one active scientist or engineer on all the boards of major British companies.

20 March 1991]

[Continued]

TABLE 1
Research expenditure: Figures on which DES calculations are based

	Science Budget			Universities			Total			GDP
	Cash	Real (90-91)	Index	Cash	Real (90-91)	Index	Cash	Real (90-91)	Index	Per Cent
1978-79	276.5	689.3	100	298.4	743.9	100	574.9	1433.2	100	0.33
1979-80	329.4	703.1	100.7	359.0	766.3	103.0	688.4	1469.4	102.5	0.33
1980-81	395.0	712.4	103.4	441.0	795.4	106.9	836.0	1507.8	105.2	0.35
1981-82	439.4	721.8	104.7	484.0	795.1	106.9	923.4	1516.9	105.8	0.35
1982-83	468.7	718.3	104.2	535.0	819.7	110.2	1003.7	1537.8	107.3	0.35
1983-84	503.2	736.6	106.7	551.0	806.6	108.4	1054.2	1543.2	107.7	0.34
1984-85	535.4	746.6	108.3	564.0	786.5	105.7	1099.4	1533.1	107.0	0.33
1985-86	571.0	755.8	109.6	609.6	806.1	108.4	1180.0	1561.9	109.0	0.33
1986-87	602.3	771.6	111.9	655.0	838.5	112.7	1257.7	1610.1	112.3	0.32
1987-88	658.2	799.7	116.0	695.0	844.4	113.5	1353.2	1644.2	114.7	0.31
1988-89	708.7	803.1	116.5	705.0	799.6	107.5	1413.7	1603.5	111.9	0.30
1989-90	815.5	868.5	126.0	715.0	761.5	102.3	1530.5	1630.0	113.7	0.29
1990-91	897.0	897.0	130.1	735.0	735.0	98.8	1632.0	1632.0	113.9	0.29

Notes:

1. Science Budget figures are derived from the grants paid to the Research Councils, etc.
2. Real terms calculations have been derived using the GDP deflator published on 20 March 1990.
3. Details of Universities' funding of research are taken from the Annual Review of R&D and exclude the Humanities.

Further Written evidence from the Science and Engineering Research Council

1. SERC'S FUNDING SHORTFALL FOR 1991-92

Before the Autumn Statement was made early in November 1990, SERC had estimated that it would need an additional sum of about £40 million to maintain its programme in level terms into 1991-92. This was made up as follows:

- Inflation in the costs of salaries and other costs of research (£28 million).
- Costs of the increased number of postgraduate studentships taken up in 1990 (£2 million).
- Higher increases in the costs of international subscriptions than had been forecast (£2 million).
- Cover for "shadow cuts" built into the 1991-92 budget (£8 million) [Note: a "shadow cut" is a non-specific reduction in expenditure required to bring the total anticipated costs of planned programmes within a total budget].

It should be emphasised that this £40 million figure refers to a particular estimate made at a particular time. The precise figure has varied since because, for example, further changes in international subscriptions have occurred. It is also worth noting that the estimate for the first item (inflation) made in March 1990, at the time of submission of SERC's Forward Look to ABRC, was £20 million. Despite these detailed changes, the overall figure of £40 million remains a good measure of SERC's requirements.

The 1990 PES produced £12 million of additional funds for SERC. SERC's "shortfall" for 1991-92 is thus about £28 million, if this is defined as the extra sum that would be needed for 1991-92 in order to avoid cutting the existing programme.

2. CERN AND INTERNATIONAL SUBSCRIPTIONS

Figure 1 repeats the data on the CERN subscription provided earlier to the Select Committee. Figure 2 combines this with the domestic expenditure on particle physics *in cash prices* over the period 1989-90. In *real terms* the domestic expenditure has been reduced by 20 per cent since 1985-86. Figure 2 also breaks down the domestic expenditure to show the part that relates specifically to experiments at CERN, as distinct from other particle physics research (e.g., carried out at HERA in Germany).

SERC has taken the view that the investment directly in the CERN subscription must be complemented by sufficient support of work in UK HEIs, backed up by support from the Rutherford Appleton Laboratory, to exploit the facilities of CERN and to remain scientifically competitive in particle physics. Nevertheless, it has still been necessary to reduce the domestic particle physics spend in real terms in order to maintain impetus in other parts of the SERC programme (see Section 3). This policy has also led, in the current funding situation, to severe pressure on the Nuclear Physics Board's support of other parts of its programme concerned with low energy nuclear physics, and hence to the threat to the Nuclear Structure Facility at Daresbury.

The decrease in the CERN subscription after 1988 reflects the results of the Abragam Review of CERN, inspired by the UK Government, and the revised method of calculating national contributions. The increase from 1990 apparent in Figure 1 arises from several main factors: (i) Swiss inflation; (ii) a 2 per cent volume

20 March 1991]

[Continued]

increase in the CERN programme that was opposed by the UK and (iii) the relatively good economic performance of the UK for 1987-89 compared with other CERN partners, which increased the Net National Income on which the subscription calculation is based.

The UK Government (not SERC) is the formal partner in CERN. Although SERC is represented on the CERN Council and Committees, the factors that change the size of the CERN subscription are mostly outside SERC's control. SERC would not advocate the system used in some other countries where international scientific subscriptions are paid directly by the equivalent of bodies like the Treasury or the FCO rather than from the Science Budget. There is a logic in counting such subscriptions as part of the science spend. But it is illogical that the increased costs of a Government treaty commitment based closely on GDP are not recognised in setting SERC's overall budget. SERC would therefore like to see explicit additions to meet unavoidable increases in the CERN subscription (and other major international subscriptions subject to intergovernmental agreements, e.g., ESA) in the outcome of the PES process.

SERC proposes the following method for dealing with this. SERC is given a planning budget in cash terms for the three years following each PES. SERC would then plan its programme for these three years on the basis of current best estimates of the costs of major international subscriptions, following validation of the estimated costs by DES or the Treasury. SERC then proposes that any increase above these estimated figures caused by non-volume increases (i.e., GDP effects, exchange rates, host country inflation) would receive automatic compensation through a budget revision, and not from a requirement to cut other parts of the Council's programme to meet the costs. The process would repeat itself each year to update the planning figures.

The problem is not so severe with international agreements where SERC itself is the formal partner (e.g., as for the La Palma and Hawaii telescopes) or where the number of partners is small (e.g., Institut Laue Langevin (ILL) and the Anglo-Australian Telescope). SERC itself is then more able to control the cost of these activities in agreeing annual budgets and subscriptions with partners.

3. GRANTS

- (i) *Spend on Grants.* Figure 3 shows that SERC's total annual budget grew modestly in real terms throughout most of the 1980's. Over this same period SERC increased substantially the *share* of the annual budget devoted to expenditure on grants to HEIs from 20 per cent in 1979 to 36 per cent in 1990—see Figure 4. SERC's target in its 1989 Corporate Plan was 40 per cent; this target will not now be met because of the reversal in the upward trend, forced by the pressures of the reducing total funding in real terms from 1991-92 onwards obvious from Figure 3.

This percentage increase in annual expenditure on grants has been mainly at the expense of spend in the Council's own Establishments on facilities and services for HEI researchers. The decrease in the latter continues over the next few years as part of the package of measures to cope with a decreasing budget in real terms.

Despite the increasing real expenditure on grants, it has not met the *demand* for grant funding from HEIs. The demand is expressed by the number and value of grant applications received in a given period (e.g., an annual grant awarding session). The ability to meet this demand is measured by the *commitment* of funds to new grants awarded during the same session. As grants usually last for three years, the funds committed will influence annual spend over the next several years. Figure 5 shows how the demand has outstripped the supply that SERC has been able to afford. This problem will increase in severity in 1991-92 because of the reduced commitment available for funding new grants. It will remain a problem in later years unless SERC succeeds in securing additional funds for general grant funding in the PES rounds. This is high on SERC's list of additional bids presented to ABRC.

- (ii) *Mechanisms of grant support.* SERC funds research grants to HEIs through a variety of mechanisms. The Nuclear Physics and APS Boards account for only about 15 per cent of total SERC grant spend, much of it being through rolling grants to major groups. These are reviewed and revised by peer review every two years. The Science and Engineering Boards comprise the major part of SERC's grant portfolio. Their grant support, through different mechanisms, is shown in Figures 6 and 7. (Note that these figures are in terms of *new grant commitment* made in a given year, not in terms of annual expenditure; hence the large IRC components in 1987-88 and 1988-89).

The mechanisms do not divide simply into "responsive" and "directed" modes of grant support. SERC's grant support is consequently often misrepresented in debates about the balance between these simplistic categories.

All SERC Committees and Directorates can receive "unsolicited" applications for grant funding. This category is clearly responsive by any definition. Initiatives in the Science Board and Specially Promoted Programmes in the Engineering Board are set up to encourage particular fields of research, e.g., molecular recognition, computational fluid dynamics. Within these fields, the mode of operation is at least partly responsive, i.e., applications are solicited within the

20 March 1991]

[Continued

general remit of the initiative, and applicants then submit grant applications on specific topics of their choice, for normal peer review. Such co-ordinated initiatives are only "directed" in the sense of their having earmarked funding provisions.

Co-funded programmes, e.g., those with the newly-privatised electricity industry, are also partly responsive in that any topic is considered on its merits provided the industrial partner is prepared to co-fund the project. The IT directorate operates through joint peer review committees with DTI, that have part of their budgets reserved for academic-only "unsolicited" grants. The IRCs originated from large numbers of ideas for interdisciplinary programmes put forward by the Board's scientific communities, and once an IRC is set up on a specific topic those working within it have freedom to develop its programme with their own ideas. LINK programmes are, on the other hand, much more fully "directed" or "pro-active", in that proposals are formed or selected by the interaction with applicants and concentrate in fairly specific areas.

There is therefore an almost continuous spectrum from "standard" committee grants at the one end to some Directorate and LINK programmes at the other. Where one draws the boundary between "responsive" and "directed" research is a matter of judgment (and probably prior prejudice!). In SERC's view over half of its grant funding is either fully unsolicited, and therefore responsive by any definition, or part of co-ordinated initiatives that consider applications purely on merit and not through some form of individual direction or shaping. It should also be noted that application for time on central and international facilities is mainly responsive in nature.

4. SETTING PRIORITIES

All Boards and Council itself have to debate the relative merits of their programmes annually as part of the planning process that sets resources for each part of their portfolio. This year's exercise has been particularly sharpened by the need to reduce the volume of the Council's programme. This has meant hard choices and sacrifices.

Each Board, through a small group of independent members, was asked to look at its priorities carefully and to identify programmes which did not have sufficiently high priority to fund within a reduced budget. The highest priority "core" programmes and the projects that had to be excluded were then considered by a similar group of independent members of Council, in order to decide the overall programme to recommend to Council. During this process Boards also revised priorities within their reduced core programmes; for example the Engineering Board decided to move funds from some programmes (e.g., IT and computing support to engineers) to others (e.g., Clean Technology and standard committee grants). Boards and Council also considered programmes that were not of sufficiently high priority to be funded within the planning budgets, but which would be the subject of bids for additional funds through ABRC.

SERC is about to embark on its next Corporate Plan. This will reconsider overall policy and balance on such issues as the priority and focus to be accorded to different areas of science and engineering, and the balance between different mechanism of funding within these areas.

5. UNDERINDEXATION

SERC is not alone in having to cope with increased costs of research caused by inflation and by other factors. Amongst the latter is the oft-cited "sophistication factor": to pursue top-quality scientific research requires more sophisticated—and hence usually more expensive—equipment than might have been acceptable in the past. It is real, but hard to quantify.

SERC's budget in cash terms (after allowing for one-off factors such as PES transfers and changes in scheduling of postgraduate fees) is 3 per cent higher in 1991-92 than 1990-91. The DES has argued that the Science Budget as a whole is 6 per cent higher in 1991-92 than 1990-91 when special factors are taken into account. Both should be compared with the level of inflation based on the retail price index January 1990 to January 1991, which is 9 per cent.

These generalised comparisons do not give the whole story. SERC *has* to pay salary increases for its own staff, negotiated as part of Civil Service terms, and of staff in HEIs working on grants (see Section 6). Over the year these have risen by 8.5 per cent and 9 per cent respectively. Inflation also affects other costs in ways that may differ from the economy generally. For example, costs in the aerospace sector of industry are quoted as having risen by 12 per cent between April 1989 and April 1990, a figure still believed to be appropriate in October 1990. This affects some of SERC's funding of space science and earth observation projects.

A round figure that SERC would require to cover cost increases in a level (but dynamically changing) programme is currently thus at least 9 per cent. It is only too obvious that this exceeds the actual provisions, and even the DES figure, by a wide margin. Every 1 per cent difference represents £4.5 million for SERC—roughly 100 typical grants or about a half of the UK's share of the cost of the ILL for its several hundred neutron users in UK HEIs.

*20 March 1991]**[Continued]*

6. ACADEMIC PAY SETTLEMENTS

Research assistants in HEIs on SERC grants are the employees of the Institution, not SERC. As such, the Institution will be obliged to pay any salary award that has been agreed, and it would be entitled to reclaim any additional payments from SERC. At present SERC research grants include the condition that "the Council will increase the research grant to take approximate account of the effect of national pay awards operative during the period of the research grant in respect of the levels of such posts as have been awarded under the research grant". The SERC has historically met the cost of university pay awards. However, Council is reviewing this position with a view to limiting its commitments on research grants. Whilst any change might vary Council's obligation to meet the cost of university pay awards, the University, as employer, would still be obliged to meet any contractual commitments it had entered into with research assistants.

7. ANNUALITY

SERC receives funds under Government Vote accounting and is required to balance its books within financial year ending on the 31 March. Most of SERC's programmes involve commitments extending over several years (see also Section 8), so it is not a trivial matter to predict spend within a given year, and then achieve it, with the precision required. Under the Resource Management Arrangements agreed between the Research Councils, DES and the Treasury in 1989, SERC can carry forward from one financial year to the next a working balance of up to 2 per cent of gross recurrent expenditure (The possible carry forward is thus about £7 million). The Council is not able (conversely) to anticipate funding from the next year to cover an overshoot in the current year.

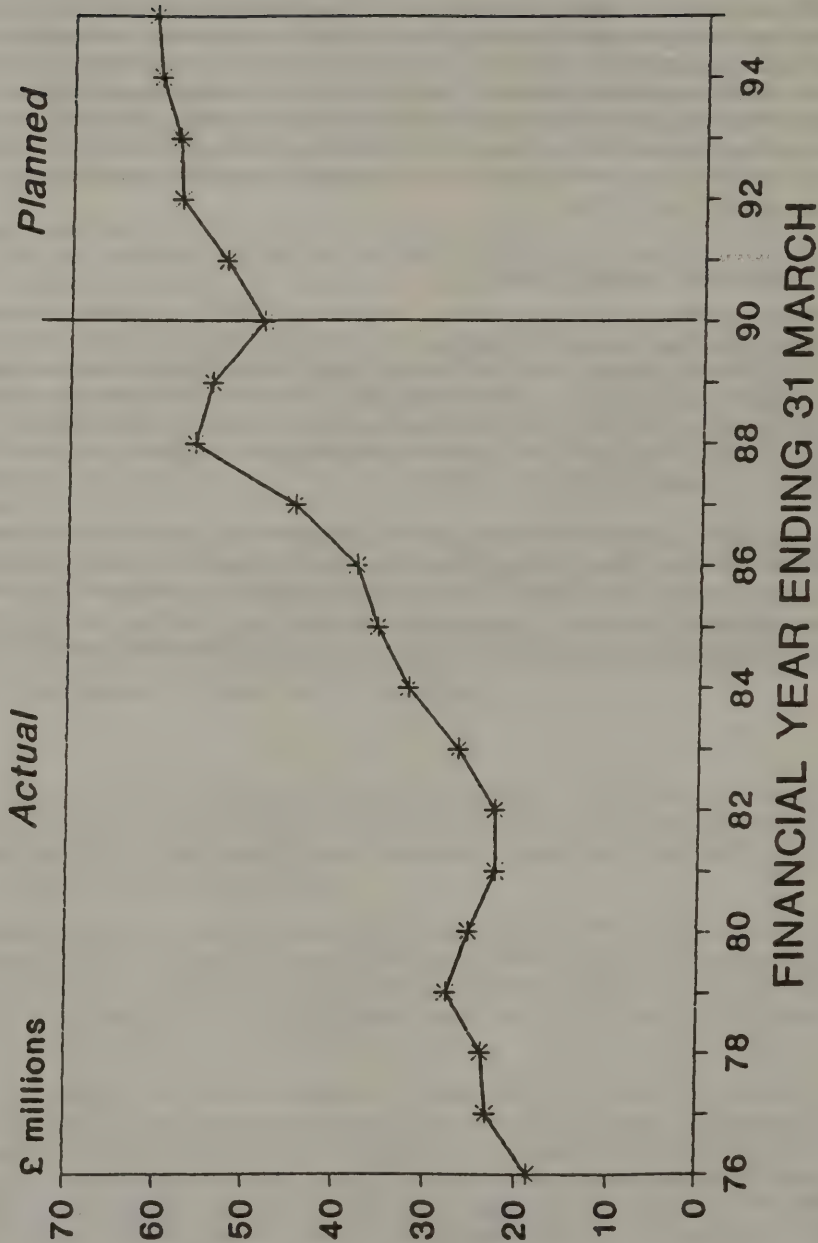
8. (UN)CERTAINTY AND (IN)STABILITY

As already evident from earlier Sections, very little of SERC's programme involves commitments of less than three years. Even the smallest "responsive mode" grants have a three year duration. Some commitments—for good scientific reasons—have to be much longer, for example to build an instrument for a facility or to participate in a space mission. The PES process, on the other hand, sets a firm budget for the forthcoming year, and planning budgets for the next two years that invariably (and especially after subtraction of the ABRC's flexibility margin) do not sustain the real level of programme implied by the first year. This is especially acute when cost inflation is high.

This mismatch inhibits the development of a properly balanced portfolio of scientific research and forces short-term caution to outweigh longer-term investment. It gives the wrong signals of switchback tactics to front-line researchers, who should be concentrating on innovation rather than retrenchment. It also gives confusing signals to partners in international collaborations, which are now the only way to pursue some areas of science and engineering. SERC's current difficulties illustrate these effects only too well.

Figure 1

CERN EXPENDITURE 1975/76-1994/95
Cash Prices

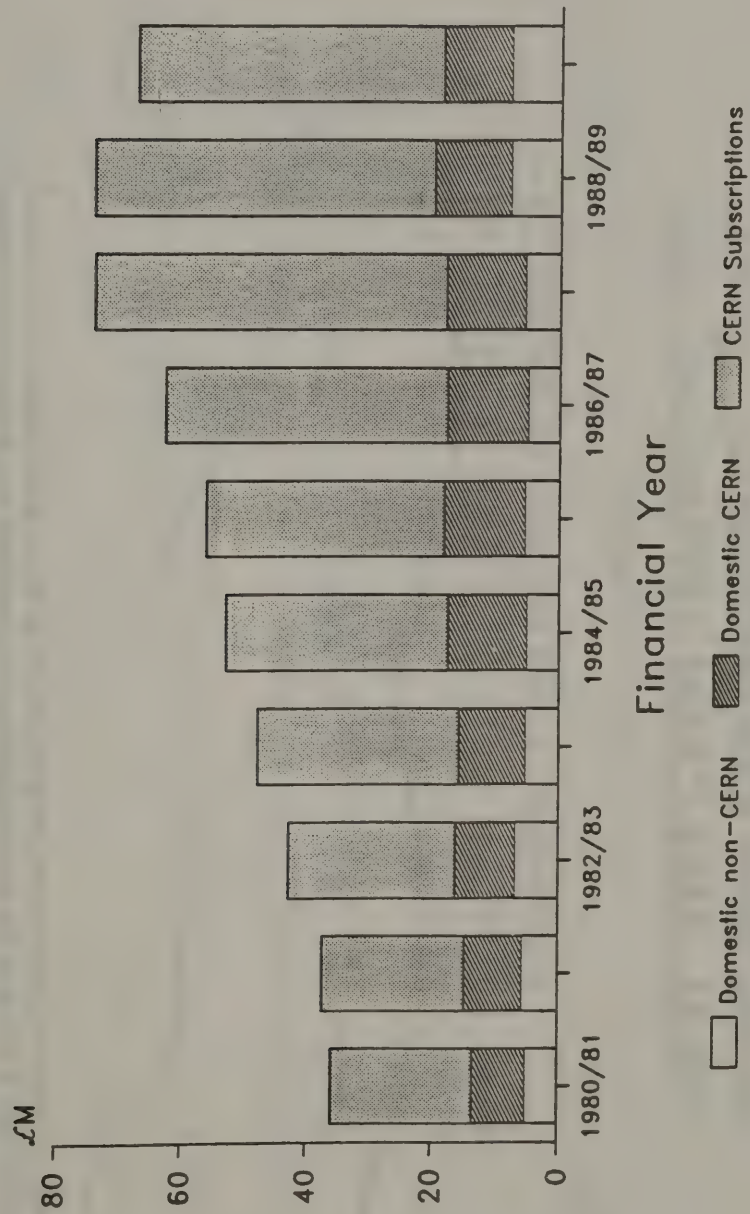


20 March 1991]

[Continued

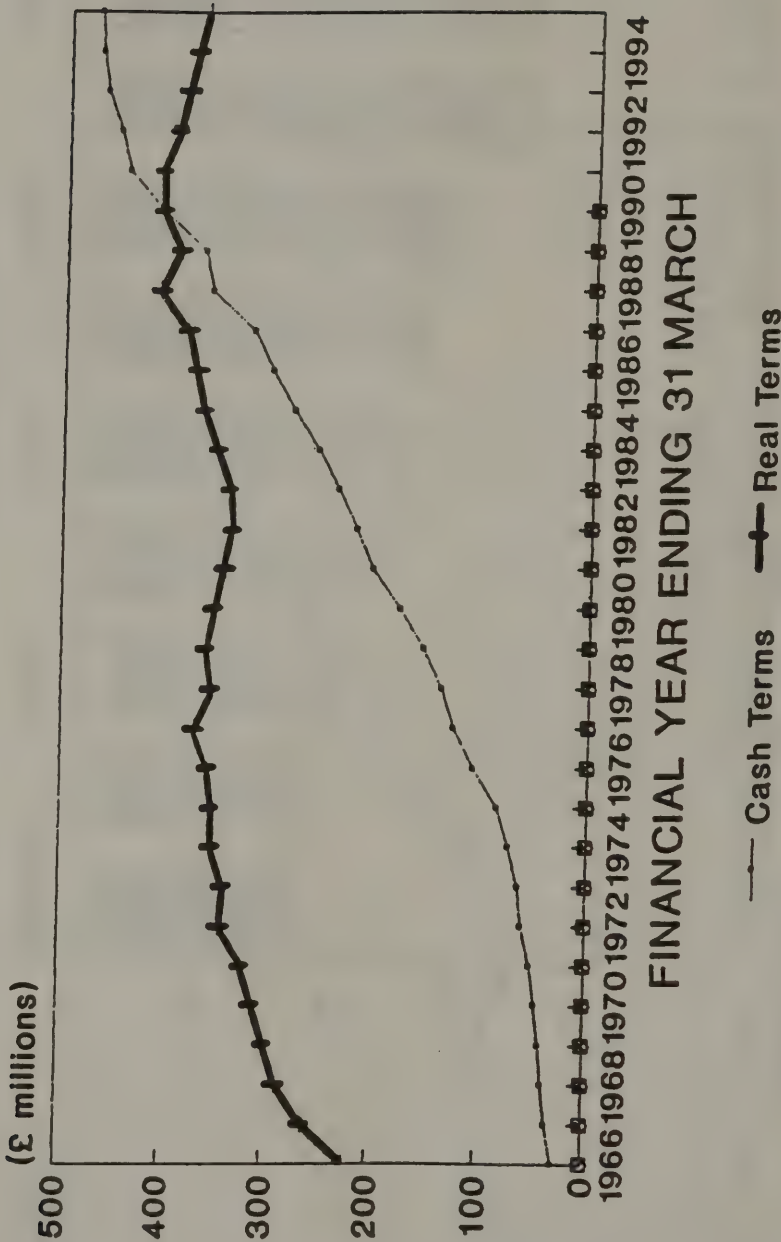
Figure 2

SERC EXPENDITURE ON PARTICLE PHYSICS (HISTORIC PRICES)



SERC NET EXPENDITURE
REAL AND CASH TERMS

Figure 3

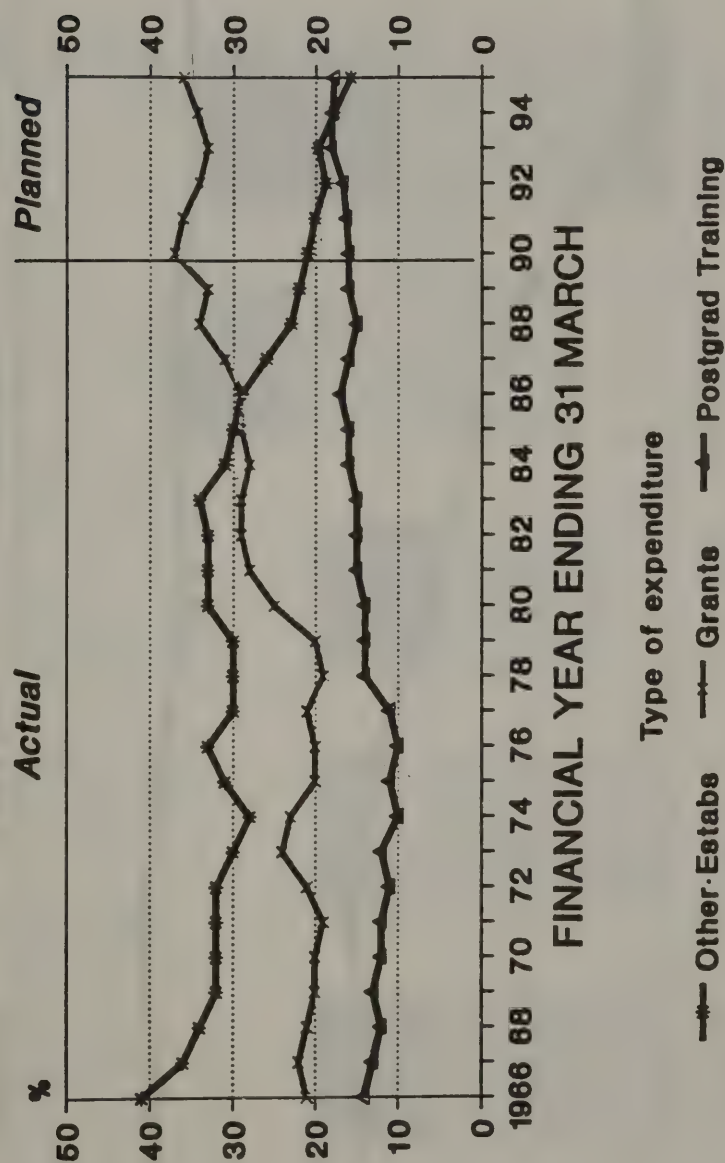


20 March 1991]

[Continued

Figure 4

PERCENTAGE OF SERC DOMESTIC EXPENDITURE BY TYPE

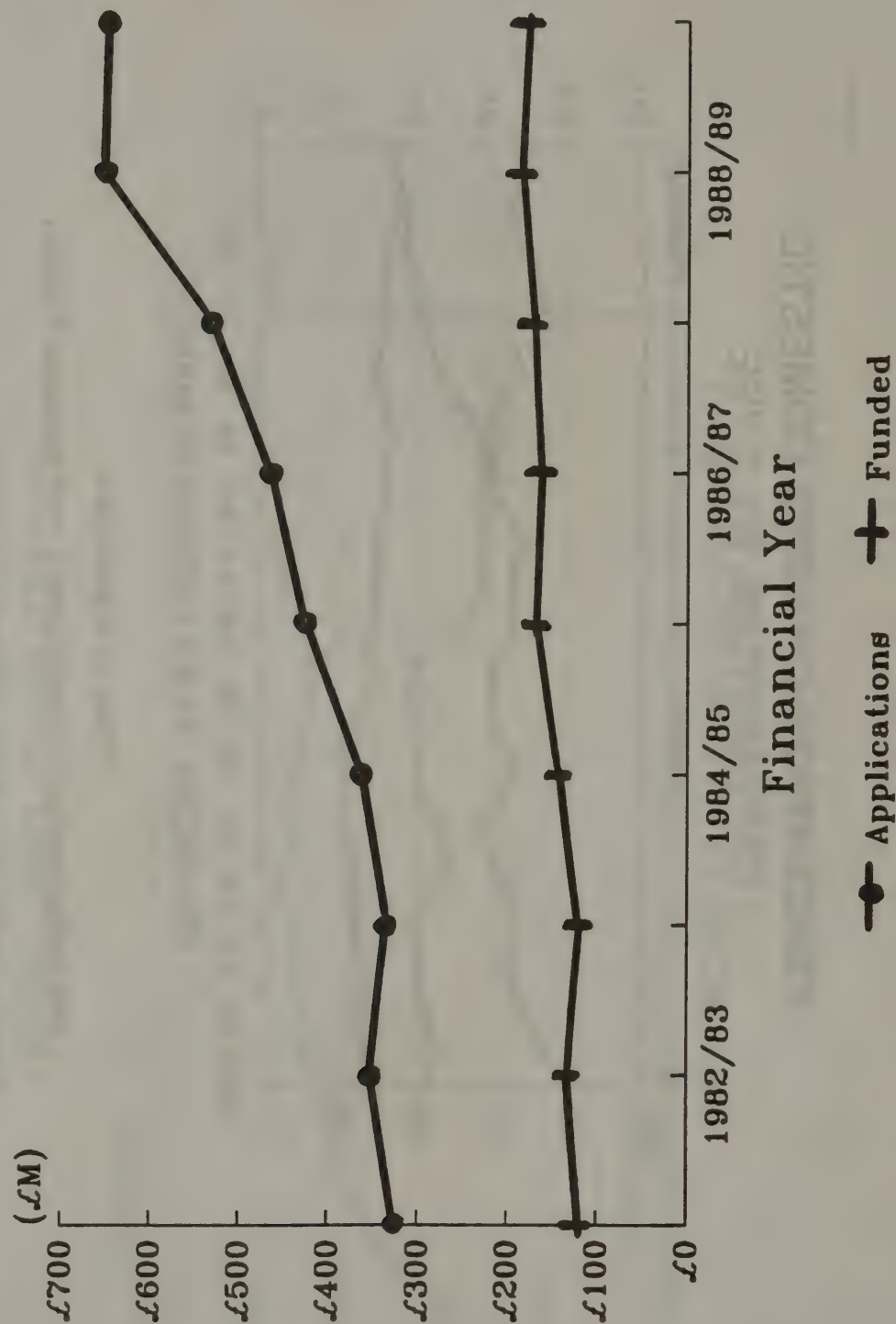


NOTE: Each type as a % of net SERC budget

20 March 1991]

[Continued

Figure 5
SERC RESEARCH GRANTS 1990/91 PRICES

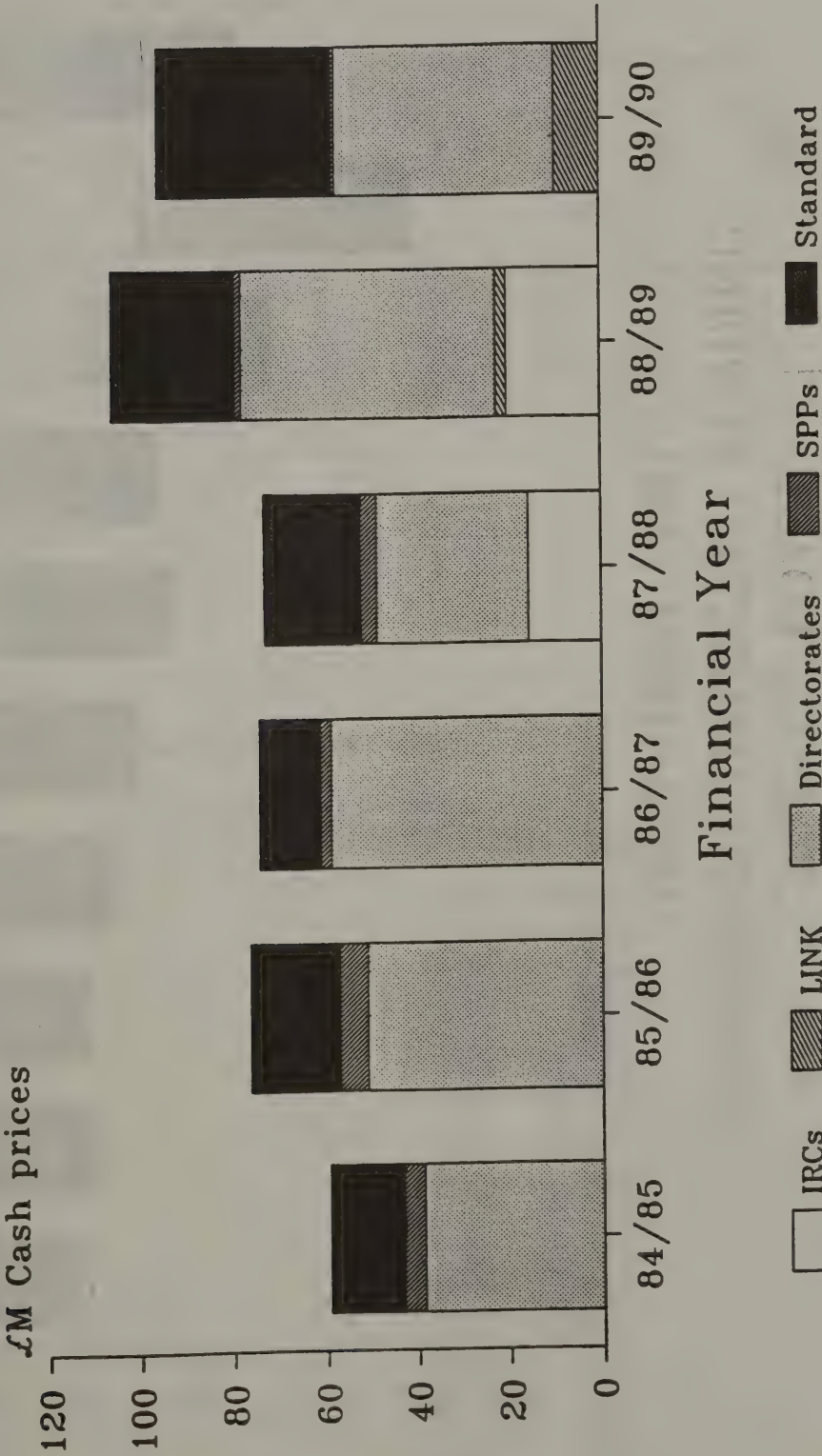


20 March 1991]

[Continued

Figure 6

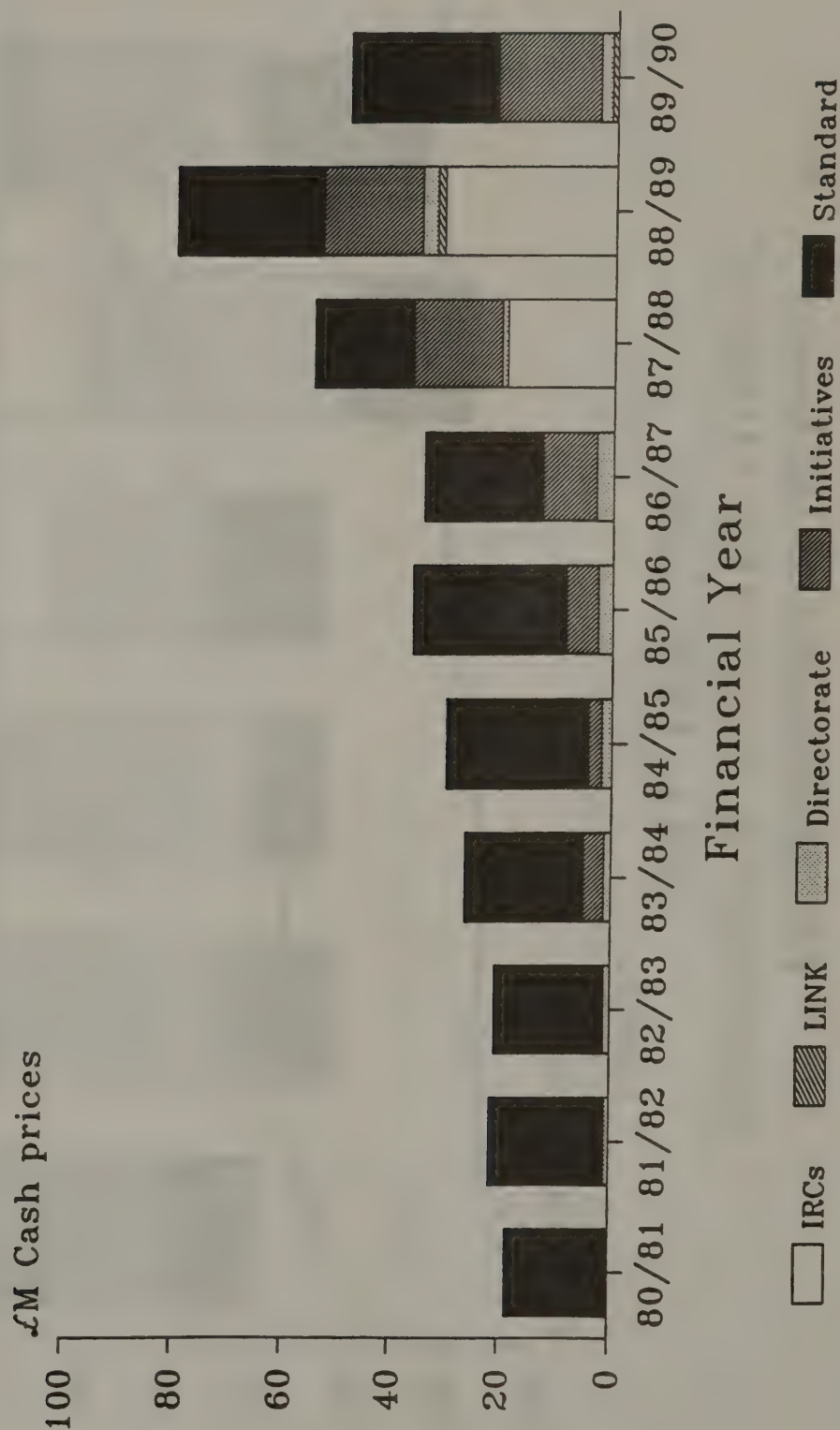
ENGINEERING BOARD
RESPONSIVE/DIRECTED FUNDING
1984-1990 (£M)



20 March 1991]

[Continued

Figure 7
SCIENCE BOARD
RESPONSIVE/DIRECTED FUNDING
1980-1990 (£M)



20 March 1991]

[Continued

Annex I—Data for Figure I

CERN AND COUNCIL EXPENDITURE 1975-76—1994-95

The following data was presented, graphically, in preparing for House of Lords Select Committee.

	1975-76	1976-77	1977-78	1978-79	1979-80	1980-81	1981-82	1982-83
CERN	18.6	23.2	23.8	27.7	25.3	22.4	22.5	26.6
SERC Alloc	106.3	125.2	136.8	153.3	175.5	201.4	216.7	234.8
Per Cent	17.5	18.5	17.4	18.1	14.4	11.1	10.4	11.3

	1983-84	1984-85	1985-86	1986-87	1987-88	1988-89	1989-90	1990-91
CERN	32.1	3.5	37.9	44.8	56.0	54.1	48.5	52.7
SERC Alloc	254.3	277.9	298.5	316.7	357.5	365.5	406.7	439.9
Per Cent	12.6	12.8	12.7	14.1	15.7	14.8	11.9	12.0

	1991-92	1992-93	1993-94	1994-95
CERN	57.8	58.1	60.3	60.9
SERC Alloc	451.7	463.0	469.2	470.7
Per Cent	12.8	12.5	12.9	12.9

Note: Sources of figures.

1975-76—1989-90 SERC Financial Statistics
 1990-91 February 1991 Outturn Forecast
 1991-92—1994-95 SERC 1991 Forward Look

Annex II—Data for Figure III

SERC net expenditure 1966-67 to 1994-95
 expressed in real and cash terms

	£'000	
	Cash terms	Real terms
1965-66	27,172	220,835
1966-67	33,445	260,658
1967-68	37,855	286,984
1968-69	41,176	297,224
1969-70	45,272	310,582
1970-71	50,428	319,811
1971-72	59,148	343,172
1972-73	63,278	340,359
1973-74	72,646	351,803
1974-75	83,803	351,803
1975-76	106,277	355,257
1976-77	125,243	369,402
1977-78	136,765	354,382
1978-79	153,308	358,865
1979-80	175,466	351,678
1980-81	201,377	341,046
1981-82	216,720	334,289
1982-83	234,806	337,802
1983-84	254,278	349,504
1984-85	277,866	363,851
1985-86	298,534	371,029
1986-87	316,735	380,717
1987-88	357,479	407,828
1988-89	365,514	389,272
1989-90	406,714	406,714
1990-91	439,930	407,340
1991-92	449,700	392,820
1992-93	463,000	386,098
1993-94	469,200	378,036
1994-95	470,700	366,420

20 March 1991]

[Continued

Annex III—Date for Figure IV*Percentage of SERC domestic expenditure 1965-66 to 1994-95 by type*

	Res grants	Postgrad	Intramural	Total SERC Expenditure
1965-66	5,740	3,685	11,246	27,172
1966-67	7,365	4,231	12,056	33,445
1967-68	8,118	4,680	12,968	37,855
1968-69	8,389	5,163	13,337	41,176
1969-70	9,126	5,537	14,431	45,272
1970-71	9,649	6,000	16,267	50,428
1971-72	12,250	6,705	19,066	59,148
1972-73	15,150	7,321	18,777	63,278
1973-74	16,779	7,592	19,837	72,646
1974-75	17,136	8,811	25,450	83,696
1975-76	21,282	11,148	34,806	106,277
1976-77	26,633	13,767	37,752	125,243
1977-78	26,423	19,059	40,591	136,765
1978-79	30,876	21,774	46,039	153,308
1979-80	43,847	24,073	56,872	175,466
1980-81	56,461	29,777	64,596	201,377
1981-82	62,803	32,983	70,313	216,720
1982-83	68,379	34,539	78,389	234,806
1983-84	71,377	40,771	79,133	254,278
1984-85	79,813	45,453	83,394	277,866
1985-86	88,051	49,516	84,528	298,534
1986-87	98,896	52,058	82,093	316,735
1987-88	120,538	54,242	81,563	357,479
1988-89	121,060	56,986	80,375	365,514
1989-90	149,011	64,182	87,952	406,714
1990-91	158,160	71,460	88,210	439,930
1991-92	150,850	74,630	86,040	449,700
1992-93	157,310	83,840	86,230	463,140
1993-94	158,960	84,610	83,920	469,200
1994-95	166,710	83,610	74,930	470,700

**Written evidence from Professor Sir Michael Thompson DSc FInstP
Vice-Chancellor and Principal, University of Birmingham**

I write in response to your Press Notice of 12 February 1991 on the above.

The present position with regard to the Science Budget, particularly its impact for the SERC, is of great concern to my University. According to the SERC's own assessment of the position for 1991-92, it will be possible "... to fund only up to half the number of new grants compared with recent years". The effect on particular areas of the Science base will also be debilitating. For Information Technology, Engineering Design and Computing in Manufacturing Engineering, sharp reductions are expected.

The futures of the Rutherford Appleton Laboratory and the Nuclear Structure Facility at Daresbury Laboratory are subject to review and it may be, especially in the case of Daresbury, that a closure decision will be necessary. Any such decision would be devastating to Nuclear Physics and would signal to our international collaborators that the United Kingdom no longer saw itself as being at the forefront of that subject and might well be unable to maintain commitments in other fields, present or future.

At the same time, our European neighbours continue to spend greater amounts on science research as expressed as a percentage of GNP. According to recent figures, the percentage of UK GNP spent on science research is 20 per cent less than that which is spent by France.

I attach, for your information some comments on the effect of the present reductions in real terms. Please contact me if you require any further information or points of clarification.

cc Mr M POWELL
Committee of Vice-Chancellors and Principals

THE UNIVERSITY OF BIRMINGHAM

Science budget 1991-92: House of Lords' Select Committee on Science and Technology

1. The effect of the present allocations to Research Councils and their impact in particular areas of science will be devastating. In the case of the Nuclear Structure Facility at Daresbury and its possible closure, this could mark the end of nuclear physics in the United Kingdom.

20 March 1991]

[Continued

This facility and others also under threat provide the base for scientific research in nuclear physics. Without these facilities serious study would no longer be possible.

2. If such drastic developments came to pass, it would be particularly disappointing, not least because United Kingdom Universities have progressively given up such facilities at individual campuses towards the central pooling of resources to serve their needs. This may have been an inevitable trend where expensive facilities are concerned, but it means that there is no smaller scale base of research to fall back on even if it was possible to carry out scientific research in nuclear physics on the basis of a smaller unit. Oxford's tandem accelerator was closed down with the specific assurance that facilities would be maintained at Daresbury accessible to the whole United Kingdom nuclear physics community.

It is difficult to see how the destruction of the base for nuclear physics research is in the national interest at a time when major advances are being made in understanding the structure and dynamics of nuclei through experiments at Daresbury.

3. It is legitimate to enquire, at a time of great public scrutiny of the effectiveness of United Kingdom Higher Education, whether central facilities are being managed as cost effectively as possible or whether there are still efficiency gains to be made before such drastic measures as closure are proposed.

It could also be considered whether there would be advantages in taking such facilities as the Synchrotron Radiation Source and the Nuclear Structure Facility out of SERC control and in placing them under the management of a consortium of British Universities. There are working models for such arrangements in the USA and the main purpose, as stated in the SERC's Corporate Plan (1989) could still be achieved i.e., the provision and development of "... advanced research facilities and services for academic research which cannot be operated on a University site because of their size and complexity".

4. In the case of areas of international collaboration, the biggest impact of the present budget allocation appears to be on Particle Physics and Space Research. Here, the United Kingdom plays distinguished roles and should continue to have an involvement commensurate with our standing as a member of the European Community and our international reputation.

It is ironic that the UFC's Research Selectivity ratings only offer the highest grade (5) to Departments who can demonstrate an international reputation. The School of Physics and Space Research at this University was so ranked in 1989 which was a reflection of our involvement in international programmes of research at CERN, Grenoble and elsewhere. Denial of the possibility for international collaborations will condemn whole areas of science to become second or third rate.

5. When the level of subscription to such facilities at CERN is considered against the level of use, restrictions in budget mean that the United Kingdom is already disadvantaged by comparison with our European neighbours. The budget to cover the use of facilities at CERN has been cut by 30 per cent in real terms in the last five years whereas the United Kingdom has had to meet increased subscriptions. Underfunding does not permit the United Kingdom to have its full share of usage. In order that other areas of science could be funded, Particle Physics has been forced to rely on international facilities at CERN and DESY (Hamburg) but underfunding does not permit use to the full potential of British Research groups.

At Birmingham, some 16 postgraduate research students are engaged on projects either in the Elementary Particle Physics group or the Nuclear Structure Physics group, together with a considerable amount of research effort by members of staff in those groups. All of this high calibre work is threatened by the present budgetary position.

6. Turning to priorities, it is important to stress that all of the ways whereby research is funded are important to the University (postgraduate grants, programme grants, postgraduate training, research centres, etc.). If priorities are considered between responsive-mode and directed-mode research funding, it would be fair to point out that, over the last few years, there has been an increased dirigisme and we would argue there should now be a move to more responsive modes of research funding.

7. In Engineering the Geometric Modelling Group at Birmingham is one of Europe's strongest research groups in Computer Integrated Engineering. It is involved in a wide spectrum of activities from fundamental generic research through computer system development to applications in Industry.

ACME has proved to be ideal vehicle for funding generic fundamental research to solve specific industrial problems. I am concerned that the proposed cutback in funds for ACME will damage our whole research strategy. It is likely to force us towards the extremes of academic research activities with reduced/delayed benefit to industry or to solving the problems of industry one at a time and in an *ad hoc* fashion, if that can be afforded.

In particular I fear for our latest proposal to ACME, which aims to specify the generic computer environment for the total engineering activity. It will change the way in which Computer Integrated Engineering Systems are structured and will facilitate the transfer of successful academic research to industry.

*20 March 1991]**[Continued]*

Where is the support coming from for those who want to be ahead of the Americans and Japanese in the application of computers to design and manufacturing engineering?

8. Turning to other matters, the University of Birmingham would favour cash limited research grants from Research Councils provided that it was possible to budget a sum for contingency and to have full freedom to vire between Heads in the total budget. This would reduce the administrative costs to Research Councils in that less detailed monitoring would be necessary.

9. It is yet to be seen what effects will arise from the proposed changes to the dual support system. There could be a weakening of the University's ability to provide high quality infrastructure services (library, computing, other central services) in support of research. Universities must have the flexibility to manage resources effectively as close as possible to the point of delivery and any diversion of DR would make that task more difficult.

An accurate assessment of the indirect costs of research can be made at the University of Birmingham. Whatever percentage addition mechanism is agreed it should in no way become the measure of the University's indirect costs chargeable to industry for contract research. This would contradict the recommendations of the Hanham Committee.

Whatever changes in dual support take place, there should be no reduction in the overall amount of research funded by the system and arrangements will need to be considered to protect research which is funded by UK charities and foundations. This is particularly relevant to medical research and an approved list of charities eligible for inclusion under dual support should be agreed subject to condition that such charities operate peer review systems in the allocation of their resources.

10. The efficiency of Research Councils in providing resources to the UK science base should be subjected to the same kinds of scrutiny as the University sector has experienced in recent years. Questions of effectiveness, management, productivity, accountability, are proper concerns of Government with respect to the Research Councils.

11. All Universities are increasingly concerned to modernise research equipment and accommodation so that scientific research can be pursued to a high standard. Perhaps, the most urgent requirement is for short-term injections of capital for buildings, laboratories and equipment to enable Universities to bring research facilities up to modern standards.

22 February 1991

Written evidence from Prof E G Wilson MSc PhD F Inst P, Queen Mary and Westfield College

THE BUTCHERY OF SMALL SCIENCE

Written evidence

1. I would like to submit the appended one page (annex A) as evidence of the anger of one small scientist at the butchery of small science presided over by the SERC.

2. This appended one page was spontaneously posted by me in this department, without knowledge of your enquiry, in response to the SERC decisions on page 3 of their press release (annex B).

Oral evidence

3. Your Committee should take some oral evidence from working scientists who are most badly affected, who are normally too busy doing science to lobby effectively, who belong to no natural big science lobby, and who make little input to the sanitised evidence that will be presented to you.

4. I would be delighted to give such oral evidence.

E G WILSON

ANNEX A

1. The top paragraph headline is a 1984 double speak headline for "RESEARCH GRANTS HALVED".

2. Work by myself and my colleagues is funded by the SERC Molecular Electronics, Semiconductor, Physics and Chemistry Committees. All their funding is halved. Halving was implemented from the last September new grant request.

20 March 1991]

[Continued

3. This is at a time when the Government funds to SERC in pounds has gone up.

4. Thus SERC presides over the butchery of small science.

E G WILSON,
Professor of Physics,
22 February 1991

ANNEX B

RESEARCH GRANTS FREEZE LIFTED

The "freeze" on some research grants will be lifted by the end of February 1991. In the Financial Year 1991-92, the Council expects to be able to fund only up to half the number of new grants compared with recent years. The Council greatly regrets the impact of this on the Universities and Polytechnics. Council expects the proportion to improve from 1992-93 onwards.

STUDENTSHIPS

£4.25 million has been earmarked in each of the planning years to support an increase of £400 in the studentship stipend.

COMPUTING

Council has had to reduce support for central computing facilities in real terms. Priority has been given to protecting supercomputing facilities and networking services provided by SERC for the academic community.

CORPORATE PLAN

Council agreed to publish its third Corporate Plan in Autumn 1991.

Letter to the Centre from Dr Anne Wright, Rector, Sunderland Polytechnic

I understand that the Select Committee will be meeting shortly to discuss the Science Budget. I should like to draw the following issues to your attention.

1. I am sure that you will receive a considerable amount of data (such as the Report from the Save British Science entitled "British Science: Benchmarks for the year 2000") which suggests the erosion of the science base and our relative position regarding other industrialised economies. I would like to make the point that the debate on whether we are or whether we are not investing as much as other countries is to some extent redundant. The real question is how much *more* we should be investing, i.e., enough to stop further erosion of science based industry or (and this would be my view) enough to ensure we can outstrip our competitor economies. The issue therefore is how fast can we enhance the science budget.

2. The research councils' present difficulties include the following:

- (a) A lack of separation of funding by SERC of the few "big" projects from that for the large number of "normal" projects.
- (b) A failure of the budget to keep pace with the inflation in "science-ware"—which is about the general rate of inflation.
- (c) An over emphasis on assessing projects before they commence and a lack of emphasis on audit of effectiveness of use of expenditure.
- (d) Failure to take account of the expansion in science which must occur as a natural corollary of development of society.
- (e) The Research Councils' predilection for interdisciplinary research centres (IRCs) has led to difficulties in terminating this type of investment in order to redirect into new and timely areas.

3. The UK is reliant on leading-edge science, i.e., on science which leads to new technologies, etc. This is high-cost. Exploitation of well established science is more cost effective in underdeveloped countries. We need to invest therefore in frontier—and so relatively high cost—research.

4. The most pressing financial problem is to provide funding for the training of future scientists in research and for funding of "x" rated projects which go unfunded through lack of cash.

5. The dual support system should be abandoned as soon as possible—it leads to a situation where a large proportion (about one-half) of academic scientists (i.e., those in Polytechnics and Colleges) cannot compete on equal terms with University staff for research council funds. This is a waste of talent.

*20 March 1991]**[Continued]*

6. The main issue delaying abandonment of dual support appear to be problems of overhead costs—necessary changes should not be thwarted by deficiencies in current practices. The aim should be to establish effective costing and audit processes for research programmes in all academic institutions.

7. In any cost analysis, the true cost should be taken into account, i.e., including for example that element of academic staff time devoted to research. It is then abundantly apparent that the present suggestions over moving funds from the UFC to research councils is only partial—in fact little more than 10 per cent of the total selective allocation for research to the UFC. Our belief is that selectivity of government funding for research should be on merit alone.

Dr ANNE WRIGHT
Rector

LETTERS TO THE CHAIRMAN ON SERC FUNDING PROBLEMS

From: Sir Michael Atiyah, President, The Royal Society

Thank you very much for writing to me about developments affecting the future of nuclear structure research in the UK.

In the light of your letter and a considerable number of similar ones, I wrote to the Chairman of SERC to convey the Society's concern that a decision with far-reaching consequences for the future of research was apparently being taken on short-term financial grounds without proper assessment of long-term priorities. I also voiced these concerns publicly on several occasions.

As you no doubt know, Sir Mark Richmond has now announced that he is setting up inquiries to review the importance of nuclear research in the context of SERC's work as a whole, and to assess the most effective way of meeting the UK's need for neutron facilities. These inquiries will report later in the year. The Society will monitor progress closely and will contribute to the inquiries as appropriate.

You may like to know that one of the issues being addressed by the Society's Science Inquiry is the management of research requiring large-scale organisation or access to high-cost facilities. SERC's present difficulties make these issues particularly pertinent, but, as you rightly point out, we shall also be wanting to consider how, in the long term, such research may best be provided for.

I shall keep you informed of any relevant initiatives taken by the Society; please draw our attention to further developments in this area.

From: Dr R Aveyard, University of Hull

NEUTRON FACILITIES AT GRENOBLE (ILL) AND RUTHERFORD APPLETON LABORATORY, (ISIS) UK

In a recent statement the Science and Engineering Research Council has said that it is unable to support these two major neutron facilities at the present level. As you know, these facilities are the world leaders of their type. Cuts, which many of us feel strongly would ultimately result from serious underfunding of basic science in the UK, would also in my view be very short sighted.

My own research Group at Hull University works in the area of surface chemistry and is concerned with the basic science underlying the physical behaviour of surfactants. These materials are the active ingredients of detergents but they have a much broader importance than this. They are present in, or have been used in the production of, a very wide range of commodities from oil products to a wide variety of foodstuffs. Surface active materials are also encountered in biological systems. The Group is not a major user at present of the neutron facilities, but we know that neutrons will be of extreme importance in the future in consolidating and extending the basic science relevant to the technology involving surfactant systems.

In conclusion, I naturally express concern that continuing support of our neutron facilities should not be at the expense of the rest of our already seriously underfunded basic research base. Having recently spent a secondment year in the research laboratories of one of the UK's top companies, I have become even more aware of how much British industry relies on our academic institutions, and the facilities they use, to produce the underpinning science on which successful technology depends.

From: Professor Bodmer, University of Illinois

I am writing as a member of the United States nuclear physics community, as a Professor of Physics at the University of Illinois, and also as a former faculty member of Manchester University.

I am quite concerned about possible cuts in the nuclear and particle physics budget of SERC of about eight million pounds, and the proposal that effectively all of this be absorbed by the nuclear physics part of this budget (about 10 million pounds) through the early closing of the Nuclear Structure Facility (NSF) at Daresbury. Such a decision would imply the winding down of nuclear physics in the United Kingdom.

*20 March 1991]**[Continued]*

The research using the NSF has received international recognition and has had a very significant influence on the understanding and development of nuclear structure. (Professor Twin was the most recent recipient of the Bonner Prize for nuclear physics of the American Physical Society as well as of the Franklin medal of the Franklin Institute, awarded for his work on superdeformed nuclei done at Daresbury.) The last decade has, in fact, seen a remarkable revitalization of nuclear physics in the UK, associated with the NSF. The UK nuclear physics community is to be lauded for achieving a highly effective program with very limited resources and one which has attracted some very able young researchers into the field.

The following are some consequences of an effective end to nuclear physics in the UK which would result from an early closing of the NSF.

The physics of nuclei is one of the major subdivisions of physics (e.g., as inorganic chemistry is to chemistry). Nuclear Physics as a basic science occupies a distinctive and in many ways central position in relation to other fields. I mention especially astronomy and astrophysics where nuclear physics is an essential ingredient for the physics of neutron stars and supernovae, for element production in the big bang and in stars, for cosmic rays, etc. Another large field is the theoretical understanding of many-body systems, of spectroscopy and of reactions. In all of these theoretical areas there has been a close interaction and cross fertilization between nuclear theory, atomic physics and condensed matter physics. Other important areas of interaction are with particle physics with the nucleus used as a probe of fundamental interactions and symmetries, e.g., of parity violation in weak interactions.

Finding support for nuclear physics will over time lead to a loss of faculty in nuclear physics at universities, with a consequent impoverishment also in other fields, and in a serious loss to the diversity of the undergraduate and graduate teaching programs.

From a broader perspective the elimination of one of the major basic areas of physics must have a narrowing effect on physics as a whole. Furthermore, the perception that the UK cannot contribute even in a quite limited way to one of the major subdivision of physics must surely be demoralizing to all of UK science and to the attractiveness of a scientific career.

Nuclear physics has many applications and relates strongly to many practical areas: Nuclear medicine, use of isotopes, element analysis, nuclear power, environmental problems of natural and man made radioactivity, the disposal of fission products, the use of instrumentation and of data analysis methods developed in nuclear physics. An active nuclear physics program provides scientists with the expertise and knowledge to be effective as well as creative in these areas. A major reduction in funding for nuclear physics will eventually lead to a drying up of this important resource of scientific expertise, with a severe and possibly irreversible loss to areas which depend on and benefit from this expertise.

What about the future of nuclear science in the UK assuming that the present level of funding continues? The upgraded NSF with EUROGAM could reasonably be expected to have a productive life well in excess of 10 years. This would provide ample time for the nuclear physics community to plan for and to make the transition to an effective and viable nuclear physics program operating in a user's mode. This would involve facilities about to come into operation, under construction or being proposed (e.g., CEBAF, RHIC in the US, TRIUMF if approved in Canada, GSI in Germany). In this way one can envisage a long term effective and viable nuclear physical activity funded with a quite moderate budget.

In view of the very serious and long term implications for nuclear physics and for science as a whole in the UK of closing the NSF at Daresbury, such a decision should be most carefully considered, not only in the context of short-term budgetary pressures, but also in the larger framework of the future and the balance of science as a whole in the UK.

I hope you will find my comments helpful.

From: Dr J G Booth, University of Salford

You will be aware that some scientific research facilities are now under threat as a result of the present underfunding of basic sciences by the present Government. Such facilities include the Daresbury X-ray laboratory in Cheshire and the major neutron facilities at the Rutherford Appleton Laboratory and the Institut Laue-Langevin (ILL) in Grenoble. Since I am a frequent user of the latter facilities and a member of the committee which allocates experimental time at ILL you will understand my concern at the damage that is being done by the present Government to the future wealth of this country both in technology know-how and manpower by its failure to provide SERC with adequate funding for their continuation. The facilities I mention are not substitutes for each other as research done at one establishment cannot be carried out at the others. This is especially true in the field of magnetic materials in which my Department has an international reputation in both the basic and applied areas. I have deplored for some time the small proportion of the GNP that is allocated to basic science in the UK, in comparison with its European partners (see Table 1, attached). Even Mrs Thatcher (who was responsible for authorising the UK to join ILL) saw the need for the UK to become a member of an Institute which is a world leader in scientific research.

20 March 1991]

[Continued

It was announced within the last few days that the US is to increase its science budget by 13 per cent and that much of this will be used to fund the large facilities which, in these days of Big Science, individual scientists and groups now need to carry out their research in a cost effective way. This is at a time when the US recession is even more marked than in the UK.

I urge you to do everything in your power to enable SERC to maintain these facilities at the level which its review bodies have previously recommended should be continued until 1994-95.

TABLE 1

*Percentage of GDP spent on "Advancement of Knowledge" by Italy, France, Germany and the UK.**

	% GDP
Italy	0.33
France	0.38
Germany	0.48
UK	0.23

Source: Annual Review of Government Funded R&D (1990), p. 39, HMSO.

From: Professor W E Burcham, University of Birmingham

NUCLEAR STRUCTURE PHYSICS IN THE UNITED KINGDOM

I am sure that the Society is aware that the budgetary difficulties being faced by the Science and Engineering Research Council may have a serious effect on many well-established scientific programmes in this country. I am writing however on behalf of one activity in which the effects may be catastrophic because of the inevitably high level of minimum viable support.

Nuclear structure physics was founded by Rutherford and Chadwick in Manchester and Cambridge and has been a major scientific discipline, with well-known and extensive applications in applied science, for most of this century. The development of the whole subject has always rested, and still rests, on fundamental advances made firstly in universities and later in national laboratories which can provide facilities too expensive for an individual university to operate. In the United Kingdom the nuclear structure community has responded to economic pressures over the last two decades by concentrating nearly its whole effort on the Nuclear Structure accelerator (NSF) at the Daresbury Laboratory. In so doing it has lost the protection that a diversity of facilities might have afforded—if the Daresbury programme cannot be funded the future of nuclear structure physics (and I include theory as well as experiment) in this country must be bleak indeed. At a time when work with the NSF at the Daresbury Laboratory has just received major recognition through the award of two international prizes to a member of one of the university groups, this would seem a wholly unreasonable development.

Nuclear structure is less well represented in the Society than it has been in the past, but there are several Fellows with particular knowledge who might share these views and I will let them know of this letter. But the whole Society ought to know that one of the great scientific traditions of the country appears to be threatened with extinction. My colleagues and I would be most grateful for anything that the Society can do, by contact with the Research Council through Officers or Assessors, or otherwise, to avert this possibility.

From: Dr R D Cannon, University of East Anglia

I am writing to you, as the Secretary of the House of Lords Select Committee on Science and Technology, about the financial crisis facing the Science and Engineering Research Council.

The SERC has apparently reached the point where it is seriously considering withdrawing one of its two neutron beam facilities, the Rutherford Appleton Laboratory (RAL), Chilton, England, and the Institut Laue-Langevin (ILL), Grenoble, France.

I am sure you will have been aware that the work done at these two centres is relevant to a wide variety of disciplines in science. Whereas at first, they were mainly used by physicists, increasing numbers of biologists and chemists regularly use them.

I would like to draw the attention of your committee to two specific points:

- (1) The experimental facilities at RAL and ILL are complementary. Not only do they involve two different types of neutron source, each of which is appropriate to different types of experiment, but the particular instruments which have been built at the two centres are, quite rationally, designed to do specific tasks and to avoid unnecessary overlap.

*20 March 1991]**[Continued*

- (2) The fact that the ILL is located in France does not mean that its loss will be felt less than would the loss of the RAL.

For research groups in this country, it is a constant struggle to maintain some kind of foothold in the competition with the large and well-funded groups in Japan and the USA. Our neutron facilities however are a unique advantage, and I very much hope that neither of them will be lost.

From: Dr T Cosgrove, University of Bristol

I am writing on behalf of my Neutron Scattering group at Bristol University Chemistry Department. Further to the recent statement from the Science and Engineering Research Council many users of the Neutron Facilities in the UK suddenly find themselves in a situation which will seriously affect their research efforts. This would be bad enough if it only thwarted University permanent staff, but it will also jeopardize ongoing PhD and PDRA projects which are already committed to using these facilities.

Although neutron research may seem somewhat erudite it is being used to solve real everyday problems both academic and industrial. In the longer term these results will be useful to a wider community and will lead to improvements both in the utility of our basic resources and in the quality of the environment.

The situation as it appears is that Neutron Researchers have effectively two sources at which they can carry out experiments, the Rutherford and Appleton Labs (RAL Didcot UK) and the Institut Laue-Langevin (ILL Grenoble France). It is true that the Rutherford Lab now has (or would have if it was fully funded) several instruments comparable to those at the ILL. However the situation is very much more complex and the two resources should be seen as complementary. Another consideration which is paramount in this discussion is that the instruments at both institutions are seriously over subscribed and in many instances undermanned. The first of these problems has come about because of the many new users who wish to use the facilities for an ever increasing range of applications. The second has arisen because of lack of financial support. Incidentally it has always seemed curious that the RAL has had to reduce its expenditure by cutting down on usable beam time. This is clearly a nonsense and further wastes resources of the permanent personnel at the establishment.

If the UK is to maintain its lead in Neutron Science and its applications then any cutback will be deleterious and will act as a further incentive for British Scientists to move abroad where sister institutions are being actively expanded and developed.

From: T L Crowley, University of Salford

I am writing to you with regard to the press briefing given by the Science and Engineering Research Council on 7 February 1991. They state that given their level of funding they are unable to support two major neutron facilities at the Institut Laue-Langevin in Grenoble and ISIS at Rutherford Appleton Laboratory.

As I am sure you are aware these two facilities are of international renown and are supported internationally and by commercial companies. They provide unique opportunities to investigate the structure of a wide range of materials of both commercial and academic importance. Both facilities are at present heavily oversubscribed and are used by large numbers of research groups spread throughout British universities and in a wide range of scientific disciplines, for example chemistry, physics, biology and materials science. Unfortunately the techniques are expensive. The status of our funding of these facilities is special because of the wide range of uses and usage across the scientific community and its direct relevance to the study and development of modern materials which will, over a period of time, have an impact on society and industry.

I am a lecturer in Physical Chemistry at the University of Salford and a principal investigator at these facilities. I use these facilities to study colloidal systems, such as paints and emulsions, surfactants and catalysts. I receive a substantial amount of funding for these projects from industries and especially ICI. This provides me with manpower, but given the expense of the techniques and the largely speculative nature of the research, direct funding of facility time would not be feasible.

I would like to make two points. Firstly, the general level of funding in science in this country is inadequate, given the quality of the science which is carried out and the importance of science to our manufacturing industry. Secondly, in order for the SERC to make up a significant shortfall in funds an obvious candidate is a large, expensive project. However, large and especially international projects cannot easily be treated in a stop-go manner. If, for example, we were to pull out of one or the other of these projects, the decision would be effectively irreversible and its impact on the scientific community would extend over many decades. It would thus appear to me that it might be advisable for the funding for such projects to be separated from the more conventional science funding. This would ease the invidious decisions which SERC has to make as to whether cut a large number of small projects or a relatively small number of large projects.

20 March 1991][Continued

From: Dr S R Elliott, University of Cambridge

I was extremely disturbed to learn recently that the SERC is considering withdrawing financial support for one, or possibly both, of the neutron-beam facilities currently supported by the UK, *viz.*, the ILL, Grenoble and ISIS at the Rutherford Laboratory.

I am sure that you are aware that the neutron beams produced by ILL and ISIS are used by an extraordinary range of scientists in different disciplines, *viz.*, physicists, chemists, materials scientists, metallurgists (chemical) engineers and biologists. Most experiments involve the characterisation and investigation of properties of materials, and utilize the *unique* characteristics of neutrons (relating to wavelength and energy) for this purpose. *No* other experimental techniques can be used instead. Furthermore, facilities such as ILL and ISIS are *extremely* cost efficient: they provide state-of-the-art experimental facilities (in many cases, available nowhere else in the world) on a time-sharing basis for the largest possible numbers of researchers. Denial of access to these facilities for British scientists, therefore, would be one of the single *most damaging* events that could be inflicted on the scientific community as a whole, bearing in mind the range of scientists and subjects which would be adversely affected.

I write as a member of the sub-committee on Liquids and Amorphous Materials at the ILL which administers beam-time for experiments there. I have seen, at first hand, that most often it is the British proposals that are the most exciting and innovative. It would be a considerable tragedy if the undoubted lead we have built up in this area over our European partners (and other international competitors) were to be abruptly and irrevocably destroyed in this way.

I write also from a personal point of view, as a user of neutrons myself. (I have published approx. 30 papers on neutron-scattering-related topics in recent years.) Although I do not make sole use of neutrons in my work, and in this perhaps I am a typical user, nevertheless they form an important and irreplaceable part of my research effort into the properties of novel glassy materials. Much of what I do *cannot* otherwise be done without the use of neutron scattering.

I write to you, therefore, to impress upon you the seriousness of the situation that the shortfall in funding for the SERC (and the other Research Councils) will cause. I should add that never before have I felt impelled to write such a letter as this to those in government. However, the measures now being proposed are so draconian that I felt that I must add my voice to that of others who are protesting against the current financial situation.

From: Dr E M Forgan, University of Birmingham

It was with great surprise that I read in the press of the intention of the SERC Council to respond to present financial difficulties by reducing its support for neutron scattering research at the Institut Laue-Langevin, Grenoble and/or at the ISIS facility in Oxfordshire. This area of research was thoroughly reviewed by an SERC panel only last year, and the panel recommended that support should remain at the present level over at least the next few years. The SERC accepted the review, and its conclusions remain just as valid this year.

As you know, neutron scattering does not imply only nuclear physics research. Indeed, the investigations for which neutrons are used range from plastics or concrete technology and stress engineering through biology, chemistry, fluid structure to pure and applied magnetic materials research, superconductivity and fundamental physics. The penetrating nature of neutron beams, their wavelike and magnetic properties, the comparability of their energy to that of atoms and molecules in solids and liquids allows the acquisition of scientific and technical knowledge that could be obtained in no other way. It is for such reasons that the UK became a principal partner in the Institut Laue-Langevin and also developed the ISIS pulsed neutron source—a facility that has attracted participation from other countries, including Germany, Italy and Japan.

My interest in this matter arises because I have used neutron scattering over the last eight years, and have become persuaded of its usefulness, for instance in my recent investigations of important magnetic properties of the new High-Tc superconductors. As you will know, the High-Tc materials are the subject of intense international research because of the exciting possibilities for applications. My work, mainly at the Institut Laue-Langevin, but also at ISIS, has led to at least two invitations to lecture to large international conferences this year. This contribution to Britain's scientific standing would have been impossible without our commitment to the ILL.

I might add that not only is the ILL a mature scientific institute able to offer a wide range of instruments, techniques and sample environments, but it is also a fertile ground for scientific interchange not only with our European partners in the Institut but also with other UK scientists. It is a sizeable establishment, but this is *not* "big science": every year, many hundreds of small groups apply to carry out experiments at the ILL because they need access to its unique facilities. These facilities are not only keenly competed for by academic users but are also leased by industrial concerns.

*20 March 1991]**[Continued]*

It is for these scientific reasons, for our international scientific standing with countries who have made agreements to operate neutron sources, and because it is Government policy to support scientific research, that I appeal to you to help prevent the long-term scientific benefits of neutron research at both ILL and ISIS from being sacrificed in an attempt to alleviate short-term financial difficulties of the SERC.

From: Dr B J Gabrys, Brunel University

I am writing in order to express my concern about the proposed withdrawal or drastic cuts in funding of two major neutron facilities at the Institut Laue-Langevin (ILL) in Grenoble and ISIS at Rutherford Appleton Laboratory, proposed by the Science and Engineering Research Council (SERC). As a member of the neutron scattering community I rely heavily on access to these unique facilities. It is not widely advertised that the central facilities support numerous small research groups like mine, which renders them cost-effective. As a matter of fact there is a fierce competition for use of these facilities, which shows the leading rôle of such investigations.

In neutron scattering research, the fundamental aspects can be intimately linked to the more applied ones. My research is directed towards understanding of the structure and dynamics of polymers on the microscopic level. Polymers, popularly known as plastics, are an essential part of today's life and crucial for development of tomorrow's technology. A result of scientific enquiry can be made usable for industrial applications. This is clearly beneficial for both parties, since different needs of industry do not permit a long-term commitment often. The scientists are encouraged to leave their "ivory towers" and take an active interest in the needs of applied science. Is annihilation of an essential tool likely to encourage them?

From: Dr C Greaves, University of Birmingham

SCIENCE FUNDING IN THE UK

As Chairman of the House of Lords Select Committee on Science and Technology, it is important that you recognise the extreme concern of most academic scientists over the funding of science research in the UK university system. For the first time, I therefore feel the need to put my own views in writing, and hope that you appreciate that these views are commonly held in the scientific community.

Whilst I accept the need for financial restraint in times of national economic problems, the prevailing situation with respect to science funding implies a deeper and more worrying trend towards a reduction in UK spending as a function of national income, especially relative to comparable nations. During my 11 years as an active academic research scientist, I am unable to recall a time of deeper disappointment in science departments.

My own area of research involves the examination of the chemistry of the newly discovered High Temperature Superconductors, which are ultimately likely to have a very high impact in many areas of technology. Considering the UK support in this area, the UK has been able to maintain a creditable position with respect to important advances, and Birmingham has a research team of international reputation. However, in order to continue this research efficiently, it is essential to have quality structural probes such as X-ray diffraction and neutron diffraction. I currently have an application in to SERC for an X-ray diffractometer which has been very highly rated by both relevant panels and yet is unlikely now to be funded due to financial problems. On top of this, we now hear that despite the recent recommendations of the Neutron Review Panel, the future funding of neutron beam research is now under threat. This is one of the few areas where the UK has access to facilities of worldwide renown, and we are now contemplating showing our true attitude towards future scientific research by withdrawing support.

It is becoming increasingly embarrassing to try to defend the UK position to foreign research workers and, indeed, to UK nationals who have elected, quite sensibly, to continue their studies abroad.

From: Dr P G Hall, University of Exeter

I am writing this letter to protest at the basic underfunding of science in this country, and in particular at the recent decision by the SERC to either close the ISIS neutron facility at the Rutherford Appleton Laboratory (RAL) or to pull out of the Institut Laue-Langevin (ILL) at Grenoble, France.

These neutron sources allow the highest quality research in important areas and scientific research in this country as a whole would be seriously weakened if such a closure were to happen. I am a regular user of ISIS and an occasional user of ILL. Our work on the gas-solid interface and solid state chemistry is strongly related to industrial matters (e.g., catalysis) and the environment (e.g., corrosion, acid rain, etc.).

The information we get from using neutron beams to probe molecular motions and vibrations places us in the forefront of these areas of science.

*20 March 1991]**[Continued]*

From: T M Hardman, University of Reading

NEUTRON FACILITIES IN THE UK

I am Reader in Physical Chemistry in the University of Reading. My research area is "Surface Science". I have a research group of 12 people and currently control over half a million pounds in SERC and industrial funding. My research group has a high profile and excellent publications record.

We use the ISIS facility at the Rutherford Appleton Laboratory (RAL). I submitted 11 proposals for the last round of applications and yet was only given one day in time, so that we are able to do only one out of the 11 experiments that we desperately want to do. This is because the instruments that we use at RAL are in such heavy demand. There are no equivalent instruments at Grenoble on which we can do our work.

Instead of cutting the resources at RAL, the instruments CRISP and LOQ should be duplicated.

I am horrified to learn that you are cutting funding at a time when European Surface Science is expanding. The field will soon be dominated by French and German scientists as they are so much better funded than we are.

From: Professor F R Hartley, Cranfield Institute of Technology

Through your Press Release of 12 February, you sought submissions to the enquiry into the Science Budget by the House of Lords' Select Committee on Science and Technology.

Undertaking research in any field is not an easy task. It requires the continuous support and encouragement of those who undertake it. One aspect of that is the need for steady and predictable funding. The biggest single difficulty facing academic research workers at present is the uncertainty of funding. This uncertainty principally arises from the very large variations in the funding available to support research in the UK due to the significant fluctuations in the overseas subscriptions denominated in currencies other than sterling.

It would be of enormous benefit to UK science and engineering research if these fluctuations could be eliminated either by removing the funding of overseas subscriptions from the SERC's budget or by denominating them in sterling.

From: Professor J S Higgins, Imperial College of Science, Technology and Medicine

At its press briefing on 7 February the Science and Engineering Research Council issued a statement about its measures to combat the shortfall in its funding. It included the following:

"The level of funding allocated to the Science Board cannot sustain its existing programme. In particular it is unable to afford to support two major neutron facilities at the Institut Laue Langevin in Grenoble and ISIS at Rutherford Appleton Laboratory at the present level."

In recent years the ISIS and ILL sources have been providing UK scientists with the best neutron scattering facilities in the world. The complementarity of the two facilities means that the loss of severe restrictions of either would have a disastrous effect on many research programmes in the UK. In my own research I have been applying neutron scattering techniques as part of a wide ranging study of polymeric materials. In particular, for example, we have been studying polymer blends and both mixing and demixing processes. An understanding of these is vital for the successful development of new plastic materials and composites. I am one of many researchers in "small science" who need access to central neutron scattering facilities.

It would be very sad if the current under funding of British Science were to result in the loss of access to these facilities for the hundreds of biologists, physicists and chemists who need to use them just as much as the other tools of a "well found" laboratory.

I urge the Select Committee most strongly to do all it can to encourage funding of British Science at a level where such closures need not be contemplated.

*20 March 1991]**[Continued]*

From: Dr P C H Mitchell, University of Reading

NEUTRON RESEARCH IN THE UK

You will know that scientists and the informed public are worried about inadequate funding of scientific research in Britain. As a scientist I have a general, and now a particular, concern which has prompted me to write to you as Chairman of the House of Lords Select Committee on Science and Technology. I was dismayed to learn that the Science and Education Research Council may have to cut neutron facilities at the Rutherford Appleton Laboratory and the Institut Laue-Langevin. I use neutron scattering to study metal oxides. This is basic research which has important technical implications: for corrosion inhibition and for catalysis in the petroleum industry. Recently, after I had presented our work at conferences in the US and UK, two European companies approached me to discuss the possibility of using neutron scattering in their research and development programmes.

The Rutherford Appleton Laboratory and Institut Laue-Langevin neutron facilities provide academic and industrial researchers with access to state of the art equipment and high level computing and technical and professional support. The neutron facilities at the Rutherford Appleton Laboratory and Institut Laue-Langevin are complementary; many researchers need both. The Rutherford Appleton Laboratory has put Britain in the forefront of neutron applications research. The science is frontier science which attracts visiting scientists from all over the world. To cutback on neutron facilities would be yet another blow to the international standing of British science.

Most scientists recognise that science, like medicine, gets more expensive. It would indeed be too costly for every University or company to have a full range of expensive instruments. We are, therefore, committed to central facilities as at the Rutherford Appleton Laboratory. I myself visit the Rutherford Appleton Laboratory to do experiments and analyse data. The Rutherford Appleton Laboratory provides a highly cost-effective way of doing research. To cut back would indeed represent a quite scandalous waste of established resources.

Neutron funding is not about priorities. It is about the absolute level of funding of British science, low in comparison with other industrial nations and inadequate to maintain our science base. Britain is a prosperous country—our general level of prosperity has increased in recent years. Funding for scientists is not a luxury. Our task is to maintain and extend the scientific knowledge base, to educate and train the next generation of scientists—those who will be responsible for leading Britain in the high tech world of the 21st century. This is a national activity which cannot be imported: it must be done in Britain. It was the then British Prime Minister, opening the ISIS neutron facility at the Rutherford Appleton Laboratory in October 1985, who proclaimed: “Basic research can be a springboard to the creation of wealth”.

Next year, 1992, is the 60th anniversary of the discovery of the neutron by the British Nobel prize winning scientist Sir James Chadwick. Surely we are not going to celebrate this British anniversary by abolishing the neutron in Britain! The Rutherford Appleton Laboratory neutron facility is central to British science. I very much hope that you will support the maintenance of the neutron facility at the Rutherford Appleton Laboratory and Britain's contribution to the Institut Laue-Langevin and the additional Government funding needed.

From: Professor B Mottelson, Nordisk Institut for Teoretisk Fysik

It has come to our attention that the Science and Engineering Research Council is considering the possibility of closing the Nuclear Structure Facility at Daresbury. We are aware of the fact that the Council is being forced to administer major reductions in funding support but wish to express in the very strongest terms our conviction that the closing of the Daresbury Facility would be viewed by the international community as scientifically ill considered and politically undermining Britain's position as a worthy partner in collective European efforts.

In terms of science policy it just does not make sense to destroy a scientific environment that has been built up systematically on the basis of large investments over the past ten years and has succeeded so brilliantly in fulfilling the high expectations that motivated these investments. This Facility is recognised as one of the most creative and successful nuclear structure facilities worldwide; for example the recent award of the Whetherill Medal of the Franklin Institute to Peter Twin is but one of the many acknowledgements by the international community of the decisive contributions of this laboratory. We cannot doubt that serious scientific review comparing this Facility with other activities in Britain, would reveal Daresbury as one of the most successful and worthy of support.

Aside from the internal British discussion there is also a very important European perspective in the consideration of the Daresbury Laboratory. As the Research Council will be aware, the European efforts in nuclear physics involve a wide-ranging program with specialised facilities of varied sorts being supported

*20 March 1991]**[Continued]*

in the different countries. This pattern has led to a highly developed division of labour and mutual co-operation between the different members of the community each of whom supplies a part and benefits for the totality. The Daresbury facility as the only very large electrostatic machine in Europe plays a unique role in this network and the unilateral and precipitous abandonment of this commitment by the British funding authorities would have very unfortunate consequences for these European efforts.

We respectfully ask the Science Research Council to keep the above considerations in mind when considering the Nuclear Structure Facility at Daresbury.

From: M A Nagarajan, Daresbury Laboratory, Warrington

I am a theoretical nuclear physicist at SERC Daresbury Laboratory. I have been at this establishment since 1974. I was persuaded by Max Irvine and Lionel Goldfarb to join Daresbury when the decision to build the NSF was made by your Committee. I have had a close association with Manchester University and several of the theorists who had graduated from there. My field of specialisation is in scattering theory and, during the last 20 years, I have worked on heavy ion collisions.

We were informed yesterday that a decision has been taken to close the NSF by the end of 1992. My colleagues and I find this an astonishing decision because this implies a serious run-down of nuclear physics related activities in UK. I find it even more surprising in view of the high quality of experiments that have been carried out at the NSF during the last nine years. We have accepted that some sacrifices need to be made and had reappraised the priorities when the accelerator at Oxford was closed down. The current problem has arisen because of the coupling of the CERN subscription to the funds allocated to the Nuclear Physics Board. If the same philosophy of culling "big science" continues, the particle physics group may face a similar problem in a few years' time. We are aware of the fact that changes are needed from time to time, and were in the process of discussing a future facility to replace the NSF at a future date. The drastic decision to close the NSF may find us with a shortage of qualified physicists if a decision to revive the subject at a future date is made.

Many of us are astonished that a decision which affects an entire discipline has been taken without even a perfunctory review of its current standing and its future implications. I have had the immense pleasure of working in an environment which was active and where I could see very high morale. The last three months have completely broken the morale and several young members of the group are beginning to drop out of science. You were instrumental in providing an opportunity to bring in a revival of nuclear physics in UK. I am bringing my reactions to your attention because some of our misgivings have been aired by your Select Committee of the House of Lords. I only hope that any changes do not occur too late to save nuclear physics in UK.

Thanking you.

From: Professor R J Nelmes

I am writing as a member of the UK neutron-scattering community to express concern at the SERC's conclusion that its existing neutron-scattering programme cannot be maintained in the present funding crisis.

I started neutron-beam work on the Harwell reactors back in 1967 as an SERC-supported PhD student. I have made extensive use of the facilities at the Institut Laue-Langevin (ILL), Grenoble, since the mid-1970's. And more recently I have developed a substantial programme on the ISIS pulsed neutron source at Rutherford Appleton Laboratory. From 1974 onwards, I have served on many science-policy and beam-allocation committees at Harwell, ILL and ISIS, and from 1986 to 1989 I was a member of the SERC's Neutron Beam Research Committee (NBRC).

Currently, I am on a 5-year SERC Senior Fellowship, on leave from my Readership at Edinburgh University to carry out full-time research. The main theme of my research is the use of scattering techniques to obtain crystal structures under high pressure. The behaviour of condensed matter under pressure is important both for fundamental and applied science. For example, our current work includes studies of high-Tc superconductors, III-V and elemental semiconductors, and simple molecular solids (like ice). We use x-ray techniques—in the laboratory and on the UK synchrotron source—as well as neutron techniques, at ISIS and ILL. Both techniques are required because they have complementary advantages: for example, x-rays allow much higher pressures to be reached in general, but neutrons are needed to "see" light atoms in the presence of heavy ones (like hydrogen in ice). One of the major purposes of my Fellowship is to try to increase the pressure range available for neutron diffraction, to bring it rather closer to what can be done with x-rays. I have a project with a French group to develop a new pressure cell at ISIS. We have already broken the 100,000 atmosphere barrier, and now have a large EC grant under the Science Programme for further work. And I am involved with a German group in developing a different type of pressure cell for

20 March 1991]

[Continued]

single-crystal samples, for use at ILL. It is in the nature of the sources that powder diffraction under pressure is better done at ISIS and single-crystal diffraction is better done at ILL. The complementarity of these two state-of-the-art sources—one pulsed (ISIS) and the other steady-state (ILL)—is one of the strengths of the current UK programme.

I rehearse this because I believe that, in very broad terms, the character of the science, the use of ILL and ISIS, the active collaborations with European colleagues, and the need for both x-ray and neutron techniques is reasonably typical of Principal Investigators in the UK neutron-scattering community.

Towards the end of my period on the NBRC, the SERC Science Board carried out its periodic review of the neutron-beam programme. We were aware that the SERC had for some time considered cutting its participation in ILL, notionally from $\frac{1}{3}$ to $\frac{1}{4}$ or so—for purely financial reasons. (News of this proposal caused considerable damage to the UK's standing at ILL around 1985, a consequence later regretted in the SERC.) The UK community put a very substantial effort into presenting its science and the case for full participation in ILL to the Review Panel. Both ILL and ISIS were able to submit a record of proven and continuing excellence, fully justifying Mrs Thatcher's optimism when she opened ISIS in 1985 and her comment then that "it is wonderful to see how [the ILL] has blossomed into a world leader". After another five years, ISIS had similarly blossomed and both sources had become deeply tied into European condensed matter science. The eventual outcome of the Review was that the SERC reversed its policy and decided to remain a full $\frac{1}{3}$ partner in ILL (without cutting ISIS), persuaded—not at all easily—by the quality of the science, the exceptional vigour and reputation of the UK community, and the continuing effectiveness and indivisible complementarity of ILL and ISIS.

It is very depressing to think that all of this careful and time-consuming endeavour to base science policy on hard information about value for money coupled with research excellence may have been a waste of time, faced, as we seem to be, with the possibility of a crude axing, all for the want of a small amount of money on the national scale of things. Neither ILL nor ISIS has had any increase in funding in real terms for many years, nor is any sought—though both facilities are already run on very restricting budgets. All that is required is enough to maintain them at current levels for the time being.

Neutron-beam science makes a major contribution to the UK's international reputation and standing, and yields a wide range of unique contributions to fundamental and applied research into condensed matter. This surely deserves better than another wasteful and damaging crisis.

From: Dr R J Newport, University of Kent

PURE AND APPLIED RESEARCH FUNDING

In the grateful knowledge that you and your colleagues on the Lords Select Committee on Science and Technology have been striving for some time to raise the profile of pure and applied research in this country, I enclose a copy of a letter I have felt compelled to write to the Secretary of State for Education and Science. It concerns the threat to reduce substantially the support available to the SERC's neutron facility ISIS at the Rutherford Appleton Laboratory and its complement at the Institut Laue-Langevin, France. It represents something akin to the tip of an iceberg within the context of the progressive damage that has been inflicted on the country's science base, but it is the issue that sits to the fore of my own concerns at present.

I would urge you, as Chairman of the Select Committee, to use your well-appreciated knowledge and understanding of the situation, and your undoubted influence with and within the Government, to bring this sorry situation to the attention of all. One debate in the Commons is indeed progress, but rather more needs to be done across a wider spectrum if the country is to maintain an internationally competitive position in science and technology. I write not only as a research scientist in my own right, with the responsibility and privilege of teaching and training others, but also from the following background:

- Member of the Neutron Beam Research Committee of the SERC (and, incidentally of its Condensed Matter Physics Committee). I therefore have a reasonable knowledge of the UK work in the area.
- Chairman of an Experiment Selection Panel for the ISIS neutron facility; this position gives me a very good feel for the individual areas of growth—it also provides me with the figures which show oversubscription rates on the ISIS instruments rising to almost a factor of five!
- Member of the International Science Advisory Committee for ISIS; the international interest in this facility is substantial and growing.

I have also served on a committee at the ILL. My experimental work is based at ISIS, but I have worked extensively on the USA's two analogous facilities: I can honestly record my view that the UK's ISIS is, at present, far superior to its American counterparts. I would like to see it stay that way.

Thank you, in advance, for your help.

20 March 1991][Continued

PURE AND APPLIED SCIENCE RESEARCH FUNDING

I have read with dismay the Science and Engineering Research Council's recent press release on its funding crisis, and the ensuing newspaper reports which described the tenor of the regrettably rare debate on the subject in the Commons.

It would be possible for me to succumb to the temptation to berate you and your predecessors with a very long list of inadequacies in Government thinking, and action on the question of support for science research. It is my belief that such support should be regarded as one of the responsibilities of central importance to any administration: a state of affairs not much in evidence during the last decade, and apparently receding yet further.

However, I wish to focus my comments on one particular area of concern to me. My small research team is primarily concerned with trying to understand the behaviour and properties of novel non-crystalline (or amorphous) materials through a detailed study of the arrangement of atoms that make them up. The materials that interest me most are some of those of contemporary technological, as well as fundamental importance. For instance, we have a major programme of work devoted to the study of amorphous carbon and carbon:silicon thin-films. These systems have properties which make them useful in many areas of engineering, biotechnology and electronics—but little is understood about *why* they have these attributes and the pace of future progress will be limited unless groups such as mine can inject the necessary fundamental scientific insight. Likewise our programme on metal-doped glasses, though substantial intrinsic interest to me, was generated by the need to cast light on their behaviour in the context of non-linear fibre optics.

Whilst industry has been keen to support and encourage the work, their input is limited to the partial support of postgraduate students and other support in kind. The SERC's support *must* underpin the whole exercise. In our case the principal form in which this support must come is through the continued provision of the internationally competitive X-ray source, SRS at their Daresbury Laboratory, and more particularly of their truly world-class neutron source ISIS at the Rutherford Appleton Laboratory and its complement at the Institut Laue-Langevin in France.

It would appear that the SRS will survive the present rounds of cut-backs forced on the SERC by its inadequate budget—although it will certainly suffer in terms of its ability to maintain its competitive position. The news on the future support for neutron beam facilities is however rather more bleak. It would appear that despite having accepted the recommendations of an expert Review Panel (—made less than a year ago on the basis of an exhaustive study of UK requirements) Sir Mark Richmond now feels compelled to launch a hasty re-appraisal with a view to making substantial, perhaps fatal cuts.

I would find it hard to overstate the importance of these facilities to teams such as my own. To reduce the already lamentable level of support given them (—I think of the ISIS facility in particular, since the French and the Germans help to buffer the ILL somewhat) would be to blight not dozens, but hundreds of academic and industrial research projects. The decline in the UK's present strong position would be inevitable, as would the migration of the work to other laboratories outside the UK. This surely cannot be allowed to happen by a government which declares its commitment to a healthy science and technology base.

I would be grateful if you would take the time to offer me your own views on this dispiriting state of affairs.

Thank you.

From: Dr D McKenzie Paul, University of Warwick

I find myself dismayed by the attitude of Government to Science in this country and in particular the recent round of cuts to successful facilities and research programmes. I would like to explain my point of view to you and ask for your opinion on and help in reversing this disastrous trend.

My own background may be of relevance to the arguments I wish to put forward; therefore allow me to describe my personal route to a senior position in one of our universities and my current state of disillusionment.

My origins were within a working class environment in Scotland with a father who worked for many years then was seriously ill during most of my secondary school education and all my undergraduate studies. My University education was entirely sponsored by the tax payer. I am, of course, grateful but I also believe that I have contributed to the UK in repayment of this debt. After obtaining an undergraduate degree I studied for three years at the University of Sussex and earned a D.Phil. degree. I then worked for a further three years as a Postdoctoral fellow at the University of Edinburgh before leaving the UK to work for five years as research scientist in a European research laboratory in France. At the end of this period several options were available to me: move to the USA and work in the University or research institute, continue to work

*20 March 1991]**[Continued*

in France or return to teach and research at a UK University. I chose the latter option and have not up to now regretted that decision. During the past six years, as part of the UK teaching and research community, I have been successful in promoting my own scientific interests against keen competition from other groups despite the general lack of funding for science. This success is emphasised by the award of several large grants for us to pursue our study of "Magnetism and High Temperature Superconductivity" as well as a series of fundamental and original publications in the scientific press. My university has acknowledged my status within the university and the scientific community by promoting me to a Readership after five years from my initial appointment.

I now find myself seriously considering my future in the UK. The problems I see in the funding of scientific research in the UK are general and specific to my own chosen field of study. There is no lack of quality in the UK research effort and yet scientists find it more and more difficult to sustain a respectable programme of research. Much of Science relies on collaboration and the UK has been successful in promoting and participating in several European/International collaborations and yet the attitude of European scientists at the moment would seem to be that they cannot trust the UK to sensibly contribute to large European projects because of the risk that we will back out at the last moment or some time in the future. This is, of course, not the policy of European governments but it is what many scientists will state if you talk to them privately. Small scale science, which can be funded by a single country, is important but many techniques now require large and expensive research instruments which are only feasible if the funding for such instruments is inter governmental. It would seem ridiculous for the UK to limit the future achievements of its scientists by restricting access to these new and important techniques.

A specific example of this type of problem occurs for the funding of neutron scattering in the UK. European scientists who use neutrons as a probe of the interactions in matter are very fortunate in that they have access to two world-class facilities at the reactor of the Institut Laue-Langevin, Grenoble, France and the ISIS spallation source at the Rutherford laboratories. This is not a duplication of effort as the two sources are capable of providing neutrons with very different energies and the means of production imply that each source is optimal for a specific range of experiments. Scientists in the US are very jealous of these facilities and many collaborate with the UK as a means of gaining access to these facilities. They currently are planning their own next-generation of neutron sources in an attempt to at least compete with Europe. This is an unusual situation with the European effort leading that of the US. We now find that due to lack of funding the SERC feel that they cannot fund the participation of the UK in both sources. This is a bad decision which will reduce the effectiveness of many branches of science in the UK since neutron scattering is often an interdisciplinary technique which brings together physicists, chemists, biologists and technologists. This cut in facilities is to be investigated by a committee composed of other types of scientist. This is a reasonable approach but a similar review was carried out recently with the result that the recommendations of the committee were strongly in favour of neutron scattering as a method of investigating nature and the conclusion that both sources were necessary.

I would be interested in hearing your views on the funding of UK science and in particular the scenario for the future.

From: Dr S J Perkins, Royal Free Hospital School of Medicine

I am writing in response to the Press Notice issued by the Science and Engineering Research Council (SERC) on 6 February. The recent science vote has only given the SERC a three per cent increase in its funding, even though inflation has been about 10 per cent over the past year. The SERC thus says it is unable to afford continued support for its two major neutron facilities at the ILL in Grenoble and the ISIS at the Rutherford. This shortfall follows a continued shortage of science funds in the UK at least over the past decade, even though science funds in countries such as the USA are being increased.

I use neutron beams in experiments on blood proteins. Defects in these proteins are closely related to disease. In one of my projects, neutrons enable us to study directly and uniquely the changes in the lipid structure of lipoproteins as it becomes oxidatively damaged. This is thought to be important as a major stage in the development of atherosclerotic plaques in arteries. In my other neutron project, I determine the structures of the large "complement" proteins of the immune system, which are formed as a mosaic of smaller protein structures. These cannot be studied by X-rays because they are quickly damaged in an X-ray beam. I have used neutrons for over 12 years; considerable financial investments have been made in facilities for my laboratory to undertake this type of work; and I have a high publication rate in this field in leading biochemical journals.

The use of neutron facilities is essential for this type of basic research, so any threat to close the ILL or ISIS to access by British scientists as a result of the underfunding of British science will be a further setback to the research base of the UK. Taking the ILL as an example, perhaps I could emphasize that this is very well-run and represents excellent value for money. Beamtime applications are highly competitive, so only the best experiments get to be done. Because the ILL is a multiuser facility, the units costs for my experiments

*20 March 1991]**[Continued]*

are relatively low, and are comparable to other techniques for protein structure determinations. My experiments currently benefit four different collaborating research groups in London, Oxford and Cambridge, and this emphasizes the concept of the multiuser role of the ILL. The PhD students in my laboratory receive a sound training that will strongly benefit their subsequent research careers in UK industry or UK academia.

If the SERC is forced to withdraw from either of the ILL or ISIS, this would be a blow to our scientific standing in Europe, as both the ILL and ISIS are multinational in their scope. Since the ILL and ISIS have obtained much public support from government organisations, which includes statements from the former Prime Minister Mrs Thatcher, as well as neutron review panels of the SERC, I do hope that every effort could be made to rectify the underfunding of British science which is at the root of this problem.

From: K Prassides, University of Sussex

I write to you in your capacity as Chairman of the House of Lords Select Committee on Science and Technology to express my deep concern and disappointment for a recent decision by the Science and Engineering Research Council. It is being proposed to reduce support for the two major neutron facilities at the Institut Laue-Langevin in Grenoble and ISIS at the Rutherford Appleton Laboratory.

Neutrons are unique experimental probes of matter and are used extensively in many technologically important areas of research. For example, my own research and that of my group in the highly competitive area of modern superconducting materials will have to be abandoned altogether if the Council can no longer sustain funding for neutron science. The sad result of such action will be for the UK to lose its leading position in condensed matter research with major consequences on our technological competitiveness in the near future.

From: Dr T Rayment, University of Cambridge

It was with a great sense of disappointment that I have learnt in recent days of the SERC's proposal to curtail its involvement in Neutron Scattering.

I have had many years of experience in neutron scattering in the area of surface science. Initially these studies were undertaken at AERE Harwell. Experiments typically lasted three days, during which time all of the equipment had to work perfectly. Moving to the ILL Grenoble revolutionised my work due to the factor of 30 improvement in flux and instrumental efficiency. In my experience the most unusual feature of ILL and the Rutherford Appleton Laboratory has been their availability to any UK research worker (established or otherwise) and their openness to innovation. The scientific programme is reviewed every six months. If progress is not enough or the programme just repetition of previous work, then the work will not be permitted to continue—even if the research group is large or eminent. It is this encouragement of scientific competition, coupled with a lack of bureaucracy, that have made both centres the best in the world. Furthermore, these centres are extremely cost-effective, I believe, since they can be used as demanded by the project. People are not compelled to continue to find experiments to use the experimental time—if their work takes them in new directions then others will come with their own new applications. In summary, these are the two best facilities in the world, giving outstanding value for money and constantly encouraging the growth of new research.

It is perhaps noteworthy that other institutions, such as that at Daresbury, now model their scientific organisation upon that established for neutron scattering.

It would not seem sensible to extinguish such shining stars of British science, to remove us from an area in which we are world leaders. These facilities are also used by British industry to maintain their competitive lead in the area of catalysis.

We offer these facilities to any researcher with ideas—these are especially attractive to young academics. Many have established their world reputation via these establishments. If these establishments are closed, we will not be able to keep these people from going abroad where our competitors are investing strongly in fundamental and applied science.

Therefore I would ask you to use your influence to reverse the decisions made by the SERC and to deal with the underlying problems of under-funding of British science.

From: Dr R W Richards, University of Durham

I am writing to you concerning a particular aspect of the current crisis in the SERC budget. It appears that once again the support for condensed matter research using neutron beams is under threat. The SERC has stated that it can no longer support all of the current activities in neutron beam research and has

20 March 1991]

[Continued

commissioned yet another review. Since a major review was completed and reported only last year, this suggests that the result of the earlier review is not palatable. The results of that review have not been made public (like the ABRC recommendations), but sufficient has been "leaked" to indicate that it recommended a minimum of support at the current level.

The United Kingdom has played a major role in neutron beam research in the last 40 years. Europe currently has a considerable advantage over the rest of the world in the spectrum of neutron science that can be done. There is a growing interest in and usage of neutron beams by industrial organisations. To reduce our participation in this area of research now would be folly. Critics may point to the existence of two neutron beam sources supported by the SERC, the Institut Laue-Langevin and the Rutherford Appleton Laboratory. However, these two sources are complementary to each other and furthermore the pulsed source at the Rutherford is of the type which will form the basis of any future source for neutron beam research. Neutron beam research is not "big" science, as the chairman of the SERC said, it supports and maintains a large array of "little" science. Lastly, the continual doubts over future commitment in the UK to neutron beam research is causing considerable uncertainty in the rest of Europe about our commitment to science and technology as a whole.

I would be most grateful if you could make these worries known to your committee and of course the concern about the severe underfunding which is having a drastic affect on fundamental research of whatever kind in UK universities.

From: Dr R M Richardson, University of Bristol

I am writing to express my concern at the recent statement by the SERC that it is unable to support two neutron facilities (i.e., ILL, Grenoble and ISIS at Rutherford Appleton Laboratory) in the future. Neutron scattering is an area of condensed matter research where Britain has excelled. The provision of these National facilities has allowed *hundreds* of University groups to perform "World Class" research. These results could not generally have been achieved by other methods. Since much of the work is in materials science, it will have provided many long term benefits to the economy as well as providing an effective scientific training for young people. The success of neutron scattering techniques is attracting more research groups (both academic and industrial) and competition for "neutron beam time" is very fierce. I believe we should be considering expanding the facilities available rather than a reduction.

From: Dr S J Roser, University of Bath

I am writing to you as Chairman of the House of Lords Select Committee on Science and Technology to express my dissatisfaction at the recent effective decrease in the funding of basic science in this country.

I was appointed as a lecturer at Bath University in 1989, having followed a successful research career in Bristol and Oxford Universities. My main research interests have been in fields which although they had no original clear applications have, as a result of SERC seed money in the past, begun to have importance for companies such as BP. Part of the work has been carried out using the ISIS neutron scattering facilities at the Rutherford Laboratory, and the Institut Laue-Langevin, Grenoble. I have heard this week, and have read in the national papers, that the SERC claims it is unable to support both of these institutions at the present level. In her speech opening ISIS in 1985, Mrs Thatcher said "Basic research can be a springboard to the creation of wealth". If the Government still believes it, why are they considering closing facilities which have been acknowledged as the best in the world, and which are used (very cost-effectively) by a wide range of scientists from all disciplines?

As we begin to enter Europe, the idea of reducing contributions to the ILL will have catastrophic consequences for our role in the wider European Scientific community. I have visited many European laboratories, and have always been amazed at the level of funding they enjoy, relative to us. In simple patriotic terms, it is a shame when Italian and Spanish science begins to look better equipped to cope with the demands of the 90's than British.

I am one of the anonymous "young scientists" who have become disillusioned with the government's lack of funding of basic science in this country, with no realistic access to research grants, poorly paid and in underfunded departments. Many of my colleagues have left for other European countries, to the US or into non-scientific jobs. The nation's store of young scientists is rapidly being depleted, and the threat to one of the most successful fields we have developed can only speed this.

From: Professor J P Schiffer, Argonne National Laboratory, University of Chicago

I have just learned of the real possibility that the Daresbury NSF facility may be shut down in 1992.

As a nuclear physicist for the past 35 years and a former chairman of the Nuclear Science Advisory Committee to the US Department of Energy and the National Science Foundation, I do perhaps have some perspective of the development of our discipline, and of the unique past and current British contributions to the international fabric of our field.

*20 March 1991]**[Continued]*

Nuclear physics started in Britain early in the century, and British contributions led the field until after the second World War. Britain was second only to the United States in 1960, when I spent a very productive year on a Guggenheim Fellowship at the AERE in Harwell.

Since the 1960's funding for nuclear physics in Britain has declined steadily. Productive facilities at Birmingham, Glasgow, Harwell, Liverpool, Manchester, and Oxford were shut down one by one, and many excellent people had to cut back on their research and in their training of students. Meanwhile the field was flourishing and expanding elsewhere, especially in Germany, France, and the Netherlands.

It is very much to the credit of British nuclear physics that during this period it held together and managed to engender a centre of excellence in nuclear structure physics: the NSF at Daresbury. Major contributions to the science have come from that laboratory. The work leading to the discovery of superdeformation is the best example, it is ingenious, technically and intellectually first rate, and the results have started a new subfield of experimental and theoretical activity around the world. In recognition of the significance of this work, the American Physical Society has awarded the 1991 Bonner Prize to the leader of the NSF team. EUROGAM is a British-French collaborative effort to build a highly innovative segmented gamma-ray detector and further explore the implications of superdeformation at the NSF. But with the existence of the NSF in question, much of this work is likely to disappear.

One does not have to enumerate the reasons why the study of nuclear structure and low-energy interactions is essential for understanding our world, nor why people trained in nuclear physics are likely to be essential in the technology of our future. You will certainly recognise that the climate for scientific progress and the technical innovation in a society rests on a delicate balance, one that has to be nurtured with care. First rate science does not come from a spigot that is turned off and on at will. Surely in Britain, of all places, one does not have to belabour the obvious: that the enormous improvements of the twentieth century in the quality of life are linked directly to development in "useless" basic science? Some of the most important such developments originated in British research.

One can understand that British science policy is in a difficult phase and that many hard and potentially destructive decisions have to be made because of political necessity. But closing down the NSF will not only terminate a first-rate international center that is leading the world in nuclear structure studies, but would effectively eradicate Britain from substantial participation in the discipline of nuclear physics. The intellectual implications of such a move go well beyond disciplinary boundaries. I apologise for offering gratuitous advice, but maintaining precious excellence is of concern to all of us around the world.

From: Dr J M Seddon, University of Southampton

As Chairman of the House of Lords Select Committee on Science and Technology, I am writing to you to express my deep dismay at the impact of the shortfall of funding to the SERC on its ability to support basic scientific research in this country.

I am a (New Blood) lecturer in Chemical Physics in this Department, working on the structure of liquid crystals. This research area has already led to the development of liquid crystal display devices in watches, computers, TV screens, etc., and will undoubtedly lead to new applications in the future, in crucial fields such as molecular electronics.

The decision taken last month by the SERC to reduce its expenditure on the provision of neutron facilities at ISIS (Rutherford Appleton Laboratory) and at the Institut Laue-Langevin, Grenoble, will have an adverse effect on my own research, and that of many of my colleagues in the UK.

The situation with regard to normal SERC research grants is also now becoming critical. I and many of my colleagues are finding that even with high alpha-rated proposals, our applications are not being funded. Apart from being extremely depressing, it is a tremendous waste of our time and energy, writing applications which we know have nearly no chance of being funded.

It is also becoming increasingly difficult to recruit post-graduate students of high calibre into Physical Chemistry: the message has filtered down to our students that an academic or research career is no longer valued in this country.

I am totally unable to understand why the government does not see the dangers of a failure to invest in basic research, both for the intellectual and economic prosperity of our country. I and many of my colleagues feel an increasing sense of despair, which will ultimately lead us to abandon either our academic careers, or our country.

From: Dr G L Squires, University of Cambridge

I don't know if you remember me. We were in the Part II Physics class in 1943-44. Since 1956 I have been in the Cavendish Laboratory and at Trinity College doing research in solid state physics and polymers, mainly with thermal neutrons, and also teaching.

*20 March 1991]**[Continued*

I am writing to you now about the possible closure of the ISIS facility at the Rutherford Appleton Laboratory or the reduction of the UK membership in the Institut Laue-Langevin at Grenoble. Since the UK has made a heavy investment in ISIS I presume the former is less likely than the latter, but I would regard either step as a disaster for British science.

In the period just before we entered the ILL there was among the neutron scattering community in this country a powerful school of thought, led by Bill Mitchell, that advocated the building of a UK reactor. I was not in favour of this course, partly because I thought we did not have the resources to go it alone in this way, but chiefly because I felt that an international institute with a shared European reactor would have great advantages, technically and financially, and would attract first-class scientists from a wide area. I recollect that as the Chairman of the SRC at the time you came down in favour of the ILL option and I believe that the experience of the last twenty years has completely vindicated that decision.

I would like to make a number of specific points.

- (1) Due to a combination of properties—zero charge, wavelength-energy relation, magnetic dipole moment—thermal neutrons provide a unique and invaluable tool for probing an enormous range of properties—structural and dynamic—in condensed matter. Neutrons give information on crystalline, amorphous, liquid, soft-matter materials in different phases—magnetic, insulating, superconducting, and others. An enormous body of knowledge has been obtained since the advent of neutron sources, and there is no sign of any levelling off in its acquisition.
- (2) The power of neutron scattering as a research probe, and the novelty and variety of the instruments used in the investigations, means that the technique provides invaluable training for young scientists. Over a thirty year period I have had a succession of research students who have used the technique to investigate a range of problems in solid state physics, such as the determination of phonon and magnetic dispersion relations, martensitic transformations, polymer conformations, and various problems in conventional and high- T_c superconductors. The majority of these students have remained in the neutron field and several of them are now leading international figures.

So useful do I regard the subject of training purposes that for the last ten years I have been sending undergraduates from Cambridge to work at the ILL in the summer. The ILL is very supportive here and provides scholarships (stagiaires) for the purpose. The students return highly enthusiastic about their work, and have clearly derived much benefit from exposure to a stimulating, professional environment.

- (3) Although the neutron facilities are in themselves “large physics”, each centre supports a large number of small groups, such as my own, which are dispersed over a number of universities, technical institutions, and industrial concerns.
- (4) The spallation source ISIS and the reactor at ILL do not duplicate each other. The former gives higher energy neutrons, and they each have advantages in different types of experiment.
- (5) Although I am arguing for the continuation of funding for both ISIS and our membership of ILL, I am not saying that neutron research is necessarily more valuable than that of other branches of science and should be funded at their expense. What I am saying is that neutron research should be supported at least at its present level. I cannot argue for the other branches because I am not familiar with them to the same depth. But if similar arguments can be made for them, that would constitute a case for an increase in the total science budget.

What I find incomprehensible is the short term way we plan and finance the science research programme in this country. One-year budgeting is not compatible with proper planning. So we get ourselves into a situation where one year the SERC accepts the scientific case for neutron research at a certain level, and the next year we are told funds are inadequate to maintain this level and cuts must be made.

On a personal note, I am formally retiring at the end of the present academic year. Although I hope to continue with some teaching and research, it will be at a reduced level. So I trust that my present advocacy will be regarded at least as disinterested.

With best wishes.

From: Dr H Stanley

I am writing to express my deep concern on hearing that the Science Board cannot sustain its existing programme, and in particular is unable to afford its contribution to two major neutron scattering facilities.

I have been employed as a senior research scientist by ICI for the last three years, having gained my doctorate in physics through fundamental research into magnetism using neutrons at the Institut Laue-Langevin, Grenoble. Today, I am still using neutron scattering techniques to aid my development of controlled drug release products for ICI. This is because neutron techniques can provide unique, and often vital, information for the understanding and consequent advancement of the product. This is accepted by ICI, who together with other major companies, have made a substantial financial investment in neutron scattering techniques over recent years.

20 March 1991][Continued

The neutron is a superbly flexible tool; the techniques are applied equally well to problems in Biology, Chemistry, Physics and Engineering. The centres where this research is carried out therefore uniquely host scientists from many different disciplines, institutes and countries, thereby promoting much essential scientific cross-fertilisation. Neutron research also sustains many links between academia and industry.

A further, often overlooked collateral benefit, is the promotion of inter-cultural links. Through my research using neutron scattering I have been privileged to live for a while in both France and USA. I have worked (and lived) closely with people from France, Germany, Italy, Holland, USA, Canada, USSR, Japan, India and mainland China. I now speak both French and German fluently; including language of the colloquial every-day kind that is so difficult to learn academically.

The science carried out at the two neutron institutes has a world-wide reputation for excellence. It is science that is often focussed towards basic understanding in areas of technological importance. The UK has a very active neutron scattering community, universally respected for the skill with which they exploit and develop the neutron facilities, which are currently the best in the world. The UK's strength lies in many small groups specialising in different fields dispersed throughout the country. The proposed cut will affect almost every university. The two neutron institutes were designed to perform complementary tasks, so if one of the centres is lost, the work cannot be done at the other. Consequently the 1990 SERC Neutron Review concluded that neutron research provided good value for money and both institutes should continue to be funded at the current levels. The decision that the SERC will no longer support both neutron research institutes has therefore not been made on scientific grounds, nor has it been made for reasons of strategic national science needs in five or 10 years time. It has been made because of an immediate cash crisis. I believe that this is a particularly poor way to make decisions with long term and wide-ranging consequences for both academia and industry.

The SERC will save around 10 million pounds. The country will lose a wealth of information on subjects as diverse as paint and superconductors, CFCs and cell membranes, together with a substantial annual crop of trained scientists, managers and computer programmers. I am writing to ask you to recommend the increase of Government financial support to the SERC in order to maintain these outstanding facilities. It is surely in our national interest.

I fear that unless we can afford to invest a comparable amount of our GDP on research as our industrial competitors, innovation will not take place, and we will become sidelined as an industrial nation.

From: Professor W G Stirling, University of Keele

SCIENCE AND ENGINEERING RESEARCH COUNCIL NEUTRON FACILITIES REVIEW

I am writing to express my concern about the outcome of the review of neutron scattering currently being carried out by the Science and Engineering Research Council. I believe that serious damage could be done to British science if current financial difficulties force a substantial reduction in support for this broad-based scientific method.

The use of thermal neutrons to investigate materials is a major field of research in Britain in which British scientists continue to make very significant contributions. Neutron scattering is a unique experimental technique for the investigation of the structure and dynamics of materials. Thermal neutron beams penetrate deeply into solids and liquids and in general do not damage the sample under investigation. In contrast, other types of radiation used in scientific studies of materials are generally most sensitive to the surface region and may damage seriously the sample. Neutron scattering has a broad applicability and neutron facilities are often used by both academic scientists (biologists, chemists, materials scientists, and physicists) and, increasingly, by industrial scientists. In this way the admittedly expensive facilities are used by many scientists from different academic areas. Rather than being an example of "big science", neutron scattering is *small* science employing centralised facilities.

British scientists are uniquely fortunate in having access to the two best neutron sources in the world, the ISIS *pulsed* neutron source at the Rutherford Appleton Laboratory in Oxfordshire, and the *steady-state* nuclear reactor at the Institut Laue-Langevin, in Grenoble, France, where the United Kingdom is a major partner with France and Germany. Both installations involve important and fruitful international collaborations. It is important to note that these two sources are not interchangeable. Complementary, rather than identical, research projects are undertaken using the two sources. Together, these two neutron sources provide a most powerful resource for the study of condensed matter. There can be few other areas of current scientific research where British scientists have access to what are indisputably the very finest facilities available anywhere. The research of my group at Keele University involves neutron scattering experiments, particularly on magnetic materials, using both the ISIS and ILL sources. By using the two sets of instruments our investigations have been much more complete than would have been possible on only one of the two sources.

*20 March 1991]**[Continued*

It is clear that the Science and Engineering Research Council has difficult decisions to make on present and future research funding. While I have not attempted here to present a detailed argument in favour of the UK neutron scattering installations, I hope that I have indicated that the unique experimental facilities for neutron research should be protected from damaging cuts. The ISIS source and the ILL reactor allow first-class science to be carried out by scientists from an extremely wide range of disciplines. Any decrease in their effectiveness will have serious implications for research at Keele University and at universities throughout the United Kingdom.

Thank you for your attention.

From: Professor B T M Willis

SERC BUDGET FOR 1991-92

I am writing to you about the £40 million shortfall in the 1991-92 budget of the UK's Science and Engineering Research Council (SERC). It is ironic that this cut in the funding of basic science in the UK comes at the same time that President Bush announces (on 16 February) a doubling of the US budget for basic research.

The £40 million shortfall will force cuts in some of the existing SERC research programmes. In particular, the SERC has announced already that there will be a reduction in the level of funding of the two major neutron facilities at Grenoble (Institut Laue-Langevin) and at the Rutherford Appleton Laboratory (ISIS).

When ISIS was opened by the Prime Minister in 1985, Mrs Thatcher declared that "ILL and ISIS underlie Europe's position in condensed matter research." Since 1985 research of vital importance has been carried out at these centres in fields as diverse as high-temperature superconductivity and the structure of proteins. Over ten years ago I collaborated myself with Professor Dorothy Hodgkin OM, in using the Harwell neutron facilities (now shut down) to determine the detailed molecular structure of vitamin B₁₂. In the 1960's Harwell was the leading centre in the world for neutron-beam research, and this place was then taken over by the ILL in the 1970's and by ISIS in the 1980's. It would be wrong to abandon the pre-eminent positions which are enjoyed together by the ILL and ISIS.

I would urge you to do all you can to avoid the running down of our neutron research centres at both home and abroad.

HMSO publications are available from:

HMSO Publications Centre

(Mail and telephone orders only)

PO Box 276, London SW8 5DT

Telephone orders 071-873 9090

General enquiries 071-873 0011

(queuing system in operation for both numbers)

HMSO Bookshops

49 High Holborn, London, WC1V 6HB 071-873 0011 (counter service only)

258 Broad Street, Birmingham, B1 2HE 021-643 3740

Southey House, 33 Wine Street, Bristol, BS1 2BQ (0272) 24306

9-21 Princess Street, Manchester, M60 8AS 061-834 7201

80 Chichester Street, Belfast, BT1 4JY (0232) 238451

71 Lothian Road, Edinburgh, EH3 9AZ 031-228 4181

HMSO's Accredited Agents

(see Yellow Pages)

and through good booksellers